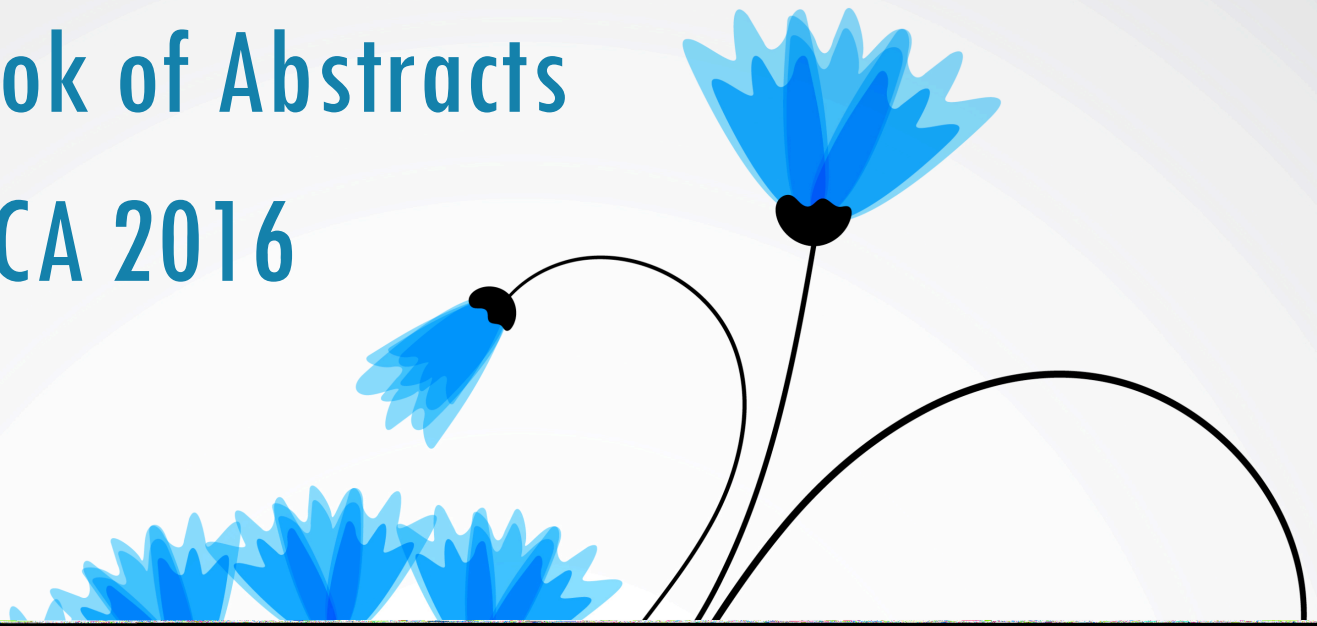


Book of Abstracts

SLCA 2016



5th International Social LCA Conference
Harvard, Cambridge, USA

June 13-15 2016

Foreword

Social LCA 2016 (SLCA 2016) is the 5th in a series of global conferences that gather cutting-edge research in social life cycle assessment. The conference or workshop has occurred regularly now, every 18 months or so, and has generally been hosted by academic institutions. The conference also cycled back and forth between Europe and Canada. During the 3rd and 4th meetings, the organizers (Gregory A. Norris and Catherine Benoit Norris) were asked about possibly hosting the 5th conference at Harvard where we both teach. We were delighted to take up the challenge.

We saw this as an opportunity to offer several things to the young and important field of Social Life Cycle Assessment:

- A chance for practitioners to gather and socialize, renew bonds, and compare research findings in both formal and informal ways across the 2-3 days in a relatively relaxed yet energized setting;
- A chance to introduce social LCA to a US audience, since up until this meeting the conferences had been in Europe and Canada;
- A chance to connect the SLCA community with important leaders from the domains of business and government, whose evolving roles and objectives we recognized were creating in them a need for what social LCA has to offer, although the field of SLCA was still to them unknown.
- In doing the latter, a simultaneous opportunity to expose a broader cross section of SLCA researchers to the practical and pressing application contexts for quantitative supply chain social assessments emerging in business and policy.

In a nutshell, we wanted to repay the favor that we had experienced in the past several SLCA conferences, by hosting another warm gathering of this close-knit and creativity community, while also opening the event up to many new faces.

The event brought together 56 contributions from around the world, from academics and businesses and government representatives. It addressed a full set of topics from databases to case studies to methodology, and it addressed a variety of application contexts.

New Earth and the Handprinting project of SHINE (the Sustainability and Health Initiative for NetPositive Enterprise, within the Center for Health and the Global Environment at the Harvard T.H. Chan School of Public Health) have jointly co-sponsored and co-funded this event, with assistance gratefully received from CIRAD. We wish to also thank a hearty band of students in the Harvard Extension School, as well as administrators at the Extension School who made breakout meeting rooms available for the conference.

We hope that the participants as well as the wider world exposed to these research and contributions will benefit from the event, ultimately in ways that strengthen humanity's efforts to improve how supply chains treat and impact us all.

Gregory A. Norris and Catherine Benoit Norris

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Life Cycle Sustainability Assessment a tool for exercising due diligence

Monday, 13th June - 14:00 - OS-1A.01 - Supporting supply chain due diligence on human and labor rights with Social LCA 1 - Knaffel Gym - Abstract ID: 79 - Oral

Prof. Bernard Mazijn¹, Dr. Jean-Pierre Revéret²

¹Universiteit Gent, ²Polytechnique Montreal/ÉSG UQÀM, CIRAI International Life Cycle Chair

The main focus of this contribution is on linking life cycle sustainability assessment (LCSA) with social responsibility (SR) in the value chain.

The few international standards (OECD Guidelines, ISO 26000, GRI ...) emphasise that due diligence along the value chain is seen as a requirement for claiming 'social responsibility'.

Life cycle sustainability assessment (LCSA) can contribute to the analysis and follow-up of exercising these duties through life cycle management (LCM) in the context of sustainable development.

The over-arching LCSA is a combination of three different life cycle assessment (LCA) techniques assessing the impacts along the value chain: environmental LCA, social LCA and Life Cycle Costing.

In particular social LCA deals with different key themes (human rights, labour conditions ...) explicitly listed in the international SR standards.

Identifying social impacts of sugarcane production in Brazil through content analysis and Social Hotspots Database

Monday, 13th June - 14:20 - OS-1A.02 - Supporting supply chain due diligence on human and labor rights with Social LCA 1 - Knaffel Gym - Abstract ID: 40 - Oral

Ms. Chongyang Du¹, Prof. Cassia Ugaya², Mr. Fausto Freire¹, Mr. Luis Dias³, Mr. Roland Clift⁴

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Brazil as the world's largest sugarcane producer has witnessed a rapid expansion of its sugarcane sector. However, sugarcane production in Brazil has been criticized for its questionable records on environmental and social sustainability due to the issues such as pre-harvest field burning, poor working conditions of field workers, and migrant workers. Social hotspots database (SHDB) is one of the first database providing information on the social risks along supply chains. The objectives of this paper are twofold: to identify the social hotspots in the supply chain of sugarcane production in Brazil, and to examine the effectiveness of SHDB in identifying social hotspots, by comparing the results derived from SHDB and through a systematic analysis of the relevant publications. Content analysis was used to examine over 60 publications related to the social impacts of sugarcane production in Brazil including peer-reviewed articles in English and Portuguese, the "grey literature", NGO reports, conference presentations and sustainability reports. Qualitative data analysis software NVivo 8 was applied to facilitate the analysis of the samples. A deductive category system was established based on the subcategories recommended in the UNEP/SETAC social life cycle assessment guidelines. The relative frequencies of each subcategory coded in the samples were computed and reported. Inter-rater and intra-rater agreements were also assessed to ensure the reliability of the results. The results of content analysis identify a list of social issues mostly mentioned in the literature, which are assumed to be the social issues of the greatest concerns, i.e. social hotspots. Social impacts of sugarcane production in Brazil were modeled in the SHDB, and the results were compared with those of the content analysis. It is found that most of the social hotspots included in the SHDB were also identified in the content analysis. However, a number of social hotspots identified in the content analysis were not captured in the SHDB, including the subcategories of local employment, social benefits and social security, and delocalization and migration. A list of social issues combining the results of SHDB and content analysis was generated and detailed information was documented to provide a comprehensive picture of the social impacts of sugarcane production in Brazil.

A Straitjacket of Rules? The Unitarian Model of Legitimacy and Embedded Non-Compliance in Multi-stakeholder Initiatives

Monday, 13th June - 14:40 - OS-1A.03 - Supporting supply chain due diligence on human and labor rights with Social LCA 1 - Knaffel Gym - Abstract ID: 68 - Oral

Mr. David Birchall¹

¹City University of Hong Kong

This paper – part of a longer study on the practice of legitimacy theory - examines the adoption of internationally accepted standards such as the ILO's Hours of Work Conventions, as the basic rights in multi-stakeholder codes of conduct (MSIs) regulating manufacturing supply chains. Using a theoretical framework based on the Unitarian Model of legitimacy, which it describes and critiques, the paper provides an empirical survey of four major MSIs application of the model. These are the Business and Social Compliance Initiative (BSCI), The Ethical Trading Initiative (ETI), The Fair Labor Association (FLA), and The Fair Wear Foundation (FWF).

I find that all codes in the study adhere closely to such standards. This leads to great similarity in the rule areas of codes, with more variety in the strictness of standards and implementation practices. I show that there are evident legitimacy gains, which can translate into compliance gains, to be made from the adoption of the model. Because the ILO is a global authority on labour issues, their rules are justifiable, difficult to challenge, and exert a normative pull. They will therefore promote stronger compliance than arbitrary, theorized standards lacking such approval. They also ensure that most relevant areas are covered.

However, I show that the utility of this model varies greatly with different rules. A stronger normative pull exists towards anti-slavery rules than it does towards collective bargaining. The result is very high levels of non-compliance around some rules, with degrees of non-compliance accepted by both regulators and auditors. While this could be part of a process of norm diffusion, I argue that it appears to embedding a norm of tolerated non-compliance around some issues, weakening trust and legitimacy, as well as limiting norm entrepreneurship.

I conclude by arguing that the model is adhered to perhaps too closely, that its logic is sound but a better understanding is needed of how and when it improves workers' rights, and that it must not be seen as a straitjacket limiting originality.

Social Life Cycle Assessment a pathway framework

Monday, 13th June - 14:00 - OS-1B.01 - Evaluating and improving supply chain impacts on human health and human well-being 1 - 1 Story street, Room 304 - Abstract ID: 21 - Oral

Mr. Miguel Simoes¹, Dr. Ana Carvalho¹, Dr. Carlos Lucas Freitas¹, Dr. Ana Barbosa-póvoa¹

¹Instituto Superior Técnico

Attempts to establish an accepted method to evaluate social aspects have been a concern amongst academics and industry. However, there is still a lack of consensus on what is the best approach to adopt regarding social assessment. The aim of this work is to identify the mid-point social impact categories for assessing products and services on a Social Life Cycle Assessment (S-LCA) pathway approach. This work has been based on an extensive literature review covering scientific articles, which are focused on social responsibility and social sustainability. This literature review has provided a database composed of 1450 social indicators. A content analysis has been performed in order to aggregate the indicators into different areas of protection, leading to standardized mid-point categories. A set of sixteen social mid-point categories has been proposed. The selection of these categories was validated through the application of a set of face-to-face semi-structured in-depth interviews. The interviews were conducted at companies from different industries in the European Union, positioned at various levels of the supply-chain. The corporate managers in charge of sustainability were the persons interviewed. To summarize, this work reinforces the foundations of S-LCA and proposes the definition of a new taxonomy for the social mid-points, which improves upon.

Considerations on the Quantification of Corruption in Preventative Costs based SLCA

Monday, 13th June - 14:00 - OS-1B.02 - Evaluating and improving supply chain impacts on human health and human well-being 1 - 1 Story street, Room 304 - Abstract ID: 49 - Oral

Mr. Pim Croes¹, Dr. Walter Vermeulen¹

¹Utrecht University & ISDRS

Context:

A large body of literature demonstrates the detrimental impact of corruption in all three sustainability pillars of Planet, People and Prosperity (PPP), e.g. (Campos & Pradhan 2007; International Chamber of Commerce et al. 2008; Mauro 1997; Søreide 2014; Wei 1999; Fagan 2010; World Bank 2016).

The UNEP guidelines for SLCA of products mention corruption as a subcategory (Benoît & Mazijn 2009, p.49). (Ekener-Petersen & Finnveden 2013) identify corruption as an important hotspot in SLCA. But to date there is no literature on the quantification of corruption in SLCA. Therefore, we may conclude that there is a research gap in the quantification of corruption in SLCA.

Objective

The objective of this presentation is to consider the available options to quantify corruption in SLCA, and especially preventative costs based SLCA, and to make a first proposal for quantification.

Method

The literature was reviewed on the options for quantification of corruption in SLCA.

For a first proposal of quantification, the Oiconomy method was followed, as described in our article (Croes & Vermeulen 2014). In this system the supply chain actors self-determine and transfer their product's cost distance to sustainability by copying their financial bookkeeping for the hidden preventative costs. If actors cannot demonstrate their own preventative costs, default values are used, equal to the marginal preventative costs. First a target (or performance reference point) is determined and thereafter the costs are determined of the preventative measures necessary to reach that target. The last and most expensive necessary measure represents the marginal costs.

Results

For the issue of corruption the official internationally accepted target is “zero tolerance”. However below a corruption index < 3.3 corruption does not seem to harm human health.

Because the ultimate business choice under pressure of corruption is not doing the business, the net profit margin is proposed as the marginal preventative measure and quantitative indicator for SLCA.

Proposed is to use a proportion of the profit margin, depending on the risk of corruption, measured by similar criteria of standard risk based certification standards, such as ISO 14001, and a scoring technique that values the common experience that reliability fast degrades with the number of governance shortcomings. A model for such scoring is proposed, which could be improved e.g. by weighting of criteria by an expert panel of experienced auditors and auditees

Necessity of including the evaluation of pesticides impacts on farmworkers health in social LCA

Monday, 13th June - 14:00 - OS-1B.03 - Evaluating and improving supply chain impacts on human health and human well-being 1 - 1 Story street, Room 304 - Abstract ID: 14 - Oral

Ms. Silvia Di Cesare¹, Dr. Catherine Macombe², Prof. Luigia Petti³, Mr. Denis Loeillet⁴

¹CIRAD, UPR GECO; University «G. D'Annunzio», Department of Economic Studies, ²IRSTEA, UMR ITAP - ELSA, ³University «G. D'Annunzio», Department of Economic Studies, ⁴CIRAD, UPR GECO

Context

The use of pesticides has been associated with threats to human health often due to the misapplication of the chemicals.

Farmworkers may be exposed to pesticides either directly through contact with spray drift (via dermal or inhalation routes) or indirectly through contact with drift deposits (dermal or ingestion) or vapour drift arising from volatilisation of deposits.

When conceiving new crops systems, correctly assessing the magnitude of the health risk from pesticide exposures in the workplace should be mandatory

About a quarter of practical application of the SLCA method are case studies in the agricultural sector. This is why it is expected that SLCA will take this issue into account, considering the large share and high impact of pesticides on farmworkers health.

Objective

This work aims to demonstrate the necessity of developing a new model to assess impacts of pesticides exposure on farmworkers' health. The authors suggest this model to be based on real practices implemented in the plantations.

Methodology

A systematic review of SLCA case studies in the agricultural sector was carried out by the authors, who have wondered whether and how impacts due to pesticides exposure were assessed. In a second step, it has been highlighted how the E-LCA methods deal with the issue of assessing pesticide exposure.

The general E-LCA models taken into account are:

- Eco-Indicator 99
- CML 2002
- EDIP 2003 (complementary with EDIP97).
- ReCiPe 2008 that represent an update of both Eco-Indicator 99 and CML 2002.

In the specific field of toxicity other IA methods (such as USEtox 1.0 and 2.0 and PestLCI 2.0) were considered. Given the close "filiation" between the different IA methods, the authors analysed only the ReCiPe and USEtox methods.

Findings and contributions

In the screened agri-food case studies, the agricultural phase is recognised as the most impactful on social sphere. Nevertheless, current methods don't allow a proper assessment of pesticides impacts on farmworkers health, neither from the SLCA side, nor from the E-LCA one. The authors therefore proposed to building a new model, specific to each crop, to be included in SLCA to anticipate future impacts. It will be based on the expertise (at least 5 experts to be interviewed) to take into account practices. The aim of the model is to describe the possible cropping systems by a network of nodes, gathering several cause/effect chains between "situation" and exposure.

Accounting for social impacts of environmental damage

Monday, 13th June - 14:00 - OS-1C.02 - Calculating product and organizational social footprints 1
- 1 Story street, Room 306 - Abstract ID: 57 - Oral

Dr. Stephan Pfister¹, Mr. Christopher Zimdars¹, Mr. Adrian Haas¹

¹ETH Zurich

1.Context

Social LCA has focused in the past on worker conditions and to some extent on improving socio-economic conditions through added value. This is also reflected by the most comprehensive database, the SHDB. Although environmental impacts are already accounted for in standard LCAs, they also affect human well-being beyond disease and mortality.

2.Objectives,

The main objective of this work is to test and evaluate how social risks can be combined with environmental impacts to have an additional dimension in the SLCA assessment that is not related to work hours, but accounts for adverse effects on social well-being of heavy pollution or destruction of natural environment.

3.Methodology/approach,

In order to account for environmental stressors in SLCA, we used the MRIO database Exiobase v2.2.2, which is to a large extent compatible with the GTAP MRIO model underlying the SHDB. Although there are some differences in sector and region resolution, the risk factors from the SHDB can be attributed to Exiobase sector and regions. Exiobase contains information on emissions and resource consumption (incl. Land and water use) for each Euro spent in these country-specific sectors (CSS). This allows accounting for impacts that affect well-being of the population and relate them to the social risks which are not specific to work conditions and therefore are not best accounted for by work hours. We select specific risks such as “Characterization of State Fragility Index” for which a high risk indicates that the government does not properly manage environmental impacts and therefore the population is supposedly more affected by environmental damage. In order to combine the different social risks we quantified risks on a numerical scale with different schemes to test sensitivity.

4.Findings and contributions.

We tested different sets of risk indicators and scales to link them to environmental impacts and applied it to textile case studies. The results have also been compared to social risks due to work hours, as provided by the SHDB, and made the two dimensions comparable by normalizing over the total annual impacts with and without risk weighting. The results showed that there is some correlation between work hours and environmentally induced social impacts, and the cotton production phase is dominating. For some processes with low work hours but high emissions (such as oversea shipping) social impacts due to environmental degradation are dominant. The method developed allows inclusion of an additional dimension affecting social well-being.

Canadian beef social life cycle assessment

Monday, 13th June - 14:00 - OS-1C.03 - Calculating product and organizational social footprints 1
- 1 Story street, Room 306 - Abstract ID: 61 - Oral

Mrs. Maeva Charles¹, Mr. Gildas Poissonnier¹, Mrs. Fawn Jackson²

¹Deloitte, ²Canadian Cattlemen's Association

This social life cycle assessment (SLCA) is part of a larger project commissioned by the Canadian Roundtable for Sustainable Beef (CRSB) that also includes an environmental life cycle assessment and an economic assessment of Canadian beef production.

The goals of this sustainability assessment were three-fold and aligned with CRSB's mission: first, to identify existing sustainability efforts within the industry and through a multi-stakeholder lens; second, to implement a monitoring framework to identify opportunities for continuous improvement of the industry; and third, to enhance transparency and demonstrate the industry's commitment to sustainability to a broad range of stakeholders. More specifically, the objective of the SLCA was to identify the social hotspots throughout the Canadian beef production value chain by identifying risks of negative impacts and highlighting good practices.

The methodology used to conduct the social life cycle assessment follows the UNEP/SETAC guidelines. It relies on a risk approach with semi-quantitative, scale-based indicators developed using international, national, or industry standards, and completed with an expert evaluation. In total, 76 farms and meatpacking plants representing 86% of the national meat packing industry were surveyed. In addition, 16 companies representing six sectors at the farm suppliers' level, seven companies representing two sectors at the distribution level, and 11 industry associations were also reviewed using generic data.

This SLCA provides documented insights as to where the Canadian beef industry could target their sustainability efforts. Results are presented through an innovative color-coded risk map presenting very low, low, medium and high risk indicators. Building on existing SLCA approaches and adapting it to the sector, this assessment provides a case-study on the application of SLCA at an industry level and offers lessons learned for other SLCA practitioners.

The Nicaragua channel evaluated with a hybrid social impact assessment / social LCA approach – what is LCA adding?

Monday, 13th June - 14:00 - OS-1C.03 - Calculating product and organizational social footprints 1
- 1 Story street, Room 306 - Abstract ID: 67 - Oral

Dr. Andreas Ciroth¹

¹GreenDelta

A lot of debate has recently been created by the planned Nicaragua channel, and a social impact assessment (SIA) study has been performed. In a recent project, the SIA study has been completed by a social LCA study which assesses the potential social impacts over the entire life cycle.

The presentation will summarise the results from the SIA and the social LCA, and characterise the different and similar findings. This will show that each approach has “blind spots” and thus benefits from a more comprehensive, broader study design. On the other side, taking the concept of additionally useful information from Stöckigt leads to a consideration of effort and validity of the additional information.

Both aspects will be discussed in detail; the analysis will lead to a conclusion about a useful combination of SIA and social LCA for the assessment of large infrastructure projects.

The discussion and conclusions will be performed on a methodological and also on a practical, case study level based on the project.

Calculating a Social Handprint

Monday, 13th June - 16:00 - OS-2A.01 - Knowing and growing social handprints (positive impacts)
1 - Knaffel gym - Abstract ID: 75 - Oral

Dr. Catherine Benoit¹, Dr. Gregory A Norris², Dr. Eileen McNeely³

¹New Earth, ²New Earth/Harvard/ILFI, ³Harvard School of Public Health

1. Context

Most of the research efforts in Social LCA have been invested in developing methods to calculate what we might call a social footprint — an assessment of the risks for worker and human “exposure” to adverse conditions and outcomes. While this is a necessary step, it is also important to value efforts to bring positive changes in supply chains — including but not limited to the reduction of risks of negative condition exposures. If positive impacts can be measured or assessed in units commensurate with the negative ones, the resulting findings may lend themselves to application within the growing body of work on Net Positive sustainability as well. So far, Net Positive methods address environmental impacts but have not been extended to include social factors.

2. Objectives

In the research presented here, we set out to develop a synthesis of existing work on Environmental Handprint assessment and Handprint-Based NetPositive Assessment (Norris 2015; see <http://www.chgeharvard.org/resource/handprint-based-netpositive-assessment>) together with the methods developed by New Earth in the context of its Social Hotspots Database (Benoit Norris et al. 2015).

3. Methodology/approach

Social LCA applications using the Social Hotspot Database implement Life Cycle Attribute Assessment — quantitative assessment of the degree to which the processes in a life cycle or supply chain exhibit attributes or characteristics of interest. Handprint-Based NetPositive assessment measures positive changes which an organization or individuals bring about, relative to “business as usual”, measured in the same units as footprints or negative impacts. We thus extend the environmental handprinting approach to address social risks in supply chains and life cycles.

4. Findings and contributions.

We provide examples of how companies can, and already are, creating social risk handprints. Through these applications we also illustrate how a company or other organization can pursue Net Positive Social risk impact. The presented framework provides a way to assess, report, and encourage positive social impacts without ignoring or downplaying in any way the social footprint — indeed, we describe how these methods are designed to increase attention to, and progress on reducing, social footprints.

Supply chain design and planning: influence of the social sustainability

Monday, 13th June - 16:00 - OS-2A.02 - Knowing and growing social handprints (positive impacts)
1 - Knaffel gym - Abstract ID: 60 - Oral

Ms. Bruna Mota¹, Dr. Ana Carvalho¹, Dr. Maria Isabel Gomes², Prof. Ana Póvoa¹

¹Instituto Superior Técnico, ²Universidade Nova de Lisboa

Industries are facing the challenge of incorporating sustainability into their supply chains. A global supply chain, which is already a very complex system to manage is now having its complexity increased with sustainability concerns from different stakeholders, namely customers, governments and overall society.

The sustainability term itself is broad and complex. If a couple of decades ago environmental sustainability was the main concern, social sustainability is currently finding its own place in the literature. The subjectivity and the lack of quantifiable indicators to address the social pillar of sustainability makes this research area quite challenging and there is still a long road to be traveled.

The objective of this work is to contribute to filling these research gaps and to do so in two ways. The first goal is to provide a decision support tool for company's decision makers to be able to adequately design and plan their already complex global supply chains. This is achieved through a mixed integer mathematical programming optimization model of a 4-echelon closed-loop supply chain with various integrated strategic and tactical decisions. Namely: supplier selection and purchase levels; facility location and capacity; technology selection and allocation; product recovery and remanufacturing strategies; transportation network definition with unimodal, multimodal and intermodal transportation options; inventory policies and stock planning; and supply planning. The second contribution of this work arises from the development and proposal of three different quantitative social indicators, based on the European Union Sustainable Development Strategy, applicable to supply chain strategic decisions. These indicators are included in the model as objective functions. Additionally an objective function measuring the Net Present Value of the supply chain is developed to assess the trade-offs between the economic and the social pillars of sustainability.

The developed model was applied to a case-study involving a global supply chain from where interesting results and important managerial insights were retrieved. Conclusions could be drawn on how considering different social objectives is significantly influencing the supply chain design and planning decisions, as well as the economic pillar of sustainability.

Apply SLCA to Compensate Foot print at rural community projects

Monday, 13th June - 16:00 - OS-2A.03 - Knowing and growing social handprints (positive impacts)
1 - Knaffel gym - Abstract ID: 85 - Oral

Mr. manuel garcia¹

¹LeanRadarOrg

Existing pipeline of projects to compensate environmental foot print are focus on CO2 reduction, with limited considerations of the Social Life Cycle Impact and targeting private sector as sponsors.

RENSAE (Sustainable Restoration of Natural Environment) has been developed and applied to demonstrate a higher Social, Environment and Economic Return of Investment from Rural Communities' Projects to compensate foot print from private sector and society activities in a responsible way.

- a) Create a Pipeline Rural Projects base on Social and Environmental CO2 life cycle impacts. (Apply SLCA model to select High Sustainable Value Added Projects).
- b) Leverage Social networks of communities and experts to promote foot print Sustainable compensation, educate the society on Environmental and Social Life Cycle Impact of our activities and increase engagement of voluntarism.
- c) Create an economic donation mechanism for private sector and communities to compensate environmental foot print achieving higher Social and environmental return on investment at the most vulnerable communities
- d) Monitoring performance of the Social and environmental CO2 life cycle impact of the rural Projects
- e) Create Rural communities appropriation of the Sustainability of the Community Capital

THE LONG AND WINDING ROAD OF SLCA. A Critical review in a paradigmatic perspective.

Monday, 13th June - 16:00 - OS-2B.01 - Collaborating to standardize indicators 1 - 1 Story street, Room 304 - Abstract ID: 7 - Oral

Dr. nathalie iofrida¹, Dr. Anna Irene De Luca¹, Prof. Giovanni Gulisano¹, Dr. Alfio Strano¹

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Social Life Cycle Assessment (sLCA) has been conceived to evaluate social impacts in a life cycle perspective, but it is not yet well defined and its process of development is being long and difficult and many different approaches and methodologies have been proposed.

sLCA has been conceptualized in an engineering milieu. However, the inherent nature of impacts under assessment are different in sLCA from environmental LCA (eLCA), having roots in different fields of study, disciplines and epistemological bases.

Post-positivism is the dominant paradigm in natural sciences, while sociology is considered a multiparadigmatic science, because many worldviews can be hold. Moving from a reflection about the repercussions of this characteristic of social sciences on sLCA literature, the aim of this research is to shift the current debate on methodologies to an epistemological level through a critical review that attempts to classify sLCA scientific literature, according to two main opposite families of social research paradigms, i.e. post-positivism and interpretivism.

Studies on sLCA have been gathered by means of the most acknowledged online academic databases and scientific literature search engines, using specific parameters of significance.

Each publication has been scrutinized according to the relevance of title, abstract and keywords; then, a speed-reading to search for topical sentences has been conducted. From a first population of works, several references have been discarded to focus exclusively on articles published in indexed and peer-reviewed journals.

A critical text analysis with literal criteria allowed ascribing each of them to the post-positivist or interpretivist family of paradigms. Results showed that about 24% could be ascribed to the first group, while 73% belonged to the group of interpretivism-oriented paradigms. These data deserve some attention, because since the beginnings of sLCA methodologies, most of the scholars claimed for application of the same assessment perspective of eLCA to social impacts. Studies belonging to the group of post-positivism-oriented paradigms mainly referred to impact pathways, cause-effect relationships, and applied mainly quantitative methods supported by mathematical/statistical relationships. Studies ascribed to the interpretivist group, principally, applied qualitative and static indicators and advocated for stakeholders participation, social values, actors or companies' behaviour, and were more context-bounded compared to first group.

Concluding, this paper attempts to provide a contribution for an advancement of sLCA development, by pointing out that, urgently, a reinforcement of the theoretical bases of sLCA is needed, with more attention to the epistemological discourse.

Using innovation to promote human rights - the use of human rights indicators for ISO 26000

Monday, 13th June - 16:00 - OS-2B.02 - Collaborating to standardize indicators 1 - 1 Story street, Room 304 - Abstract ID: 31 - Oral

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Human rights are a recurring theme in the international arena since the creation of the United Nations. Many rules, international and local, were established to ensure several mechanisms in the legal, and judicial spheres in addition to public policies. However, recently the assurance of these rights is no exclusive responsibility of States and international public bodies, but also via the private sector as an active and responsible subject. Either economic globalization or the counter-hegemonic globalization of social movements take human rights to the agenda of the companies' governance around the world. In this sense, the United Nations instruments have been established to regulate companies in the field of human rights, such as: United Nations Global Compact, UN Guiding Principles on Business and Human Rights, Business and Human Rights Forum and UNEP Guidelines for Social Life Cycle Assessment of Products. The International Organization for Standardization ISO 26000 established the guidelines for Corporate Social Responsibility, which can be used for businesses of any size and also by the public sector in its activities.

ISO 26000 rules bring an item dedicated to important human rights matters from which indicators for the theme derive. These are quantitative indicators that initially call our attention because they can assist in the evaluation that makes the business activity, as well as of the organs of government. They may be the also useful indicators for the monitoring of social impacts and human rights by the civil society.

This paper analyzes the applicability of ISO 26000 rules for the promotion of human rights through the indicators proposed, as well as discussing its importance in evaluating the social impact of business and government activities. We raised a number of questions, not intending to respond to all of them because of the innovation and complexity of the issue. We intend to show how the ISO 26000 quantitative indicators are used in the field of human rights, including the possible gains for the companies, such as governments incentive. We use state of the art research to analyze normative data and indicators, as well as human rights compliance by the actors already mentioned. We correlate human rights, social responsibility and indicators for monitoring and assessment of initiatives in companies. These are the main issues that we intend to investigate, rather than getting simplistic answers. In sum, indicators are important assessment tools for social impact of corporate businesses and government activities.

Outsourcing the regional disparity in China

Monday, 13th June - 16:00 - OS-2C.01 - Calculating product and organizational social footprints 2
- 1 Story street, Room 306 - Abstract ID: 18 - Oral

Dr. Yafei Wang¹, Dr. Ali Smawy²

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We use Chinese multi-region input-output model to calculate the inequality footprint as a measure for regional disparity in China. The inequality footprint quantifies the regional income gap producing from domestic economic activities in one region driven by the final demand from other regions and sectors. To achieve this aim, we use satellite indicators of employment and income for 30 Chinese provinces that matching Chinese multi-region input-output tables. Policy implications are expected with respect to the reduction of China's regional disparity: 1) focusing on not only local development at the micro level but also underlying drivers of other regions at the macro level, 2) directing sector transferring of embodied income from production to consumption, and 3) guiding the inter-regional economic spillovers.

Social life-cycle assessment of vicugna fiber production in the province of Jujuy, Argentina. Preliminary selection of indicators.

Monday, 13th June - 16:00 - OS-2C.02 - Calculating product and organizational social footprints 2
- 1 Story street, Room 306 - Abstract ID: 22 - Oral

Mrs. Leila Schein¹, Mrs. Silvia Curadelli², Dr. Yanina Arzamendia³, Dr. Bárbara Civit⁴

¹National University of Luján INAHE CONICET, ²National Technological University, ³Fac de Cs. Agrarias. Universidad Nacional de Jujuy, ⁴INAHE - CONICET

Natural fibers from camelids (Camelidae) have been highly valued since ancient times. The Andean native people of the Altiplano region, have been using wild vicunas (*Vicugna vicugna*) for centuries to obtain fiber and food. With the arrival of the conquerors, the indiscriminate hunting of this animal followed a supply and demand scheme to provide the European market with this product. This procedure has been maintained over time, up to the point that during the 1960's, the vicuna was in great risk of extinction. In recent years, after decades of strict conservation procedures, populations of wild vicunas have recovered, and given that vicuna fiber continues to be one of the world's most expensive animal fibers, its commercial exploitation has taken on global significance.

The presented case study is the Santa Catalina Cooperative - VICAM (Interdisciplinary research group on vicuna and camelids-CONICET Argentina) joint project for vicuna conservation and management. The productive chain of the vicuna fiber for garments begins with the inhabitants of the Altiplano at a rural stage. Their role consist in shearing wild animals using a pre-Hispanic technique called Chaku, implemented by VICAM. The recovery of this traditional practice in the region, improved with modern animal welfare protocols, has allowed the sustainable management of the resource to produce legal fiber (with a certification of origin). Shorn live vicunas are proof of this scheme of sustainable management. From the life cycle perspective, environmental, economic and social impacts determine the sustainability of the production process.

Quantitative social sustainability evaluation of Irish dairy farm

Tuesday, 14th June - 10:30 - PS-1.01 - Posters - Knaffel gym - Abstract ID: 11 - Poster

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Much research has focused on the environmental and economic analysis of dairy farming in Ireland due to its significant environmental impacts and contribution to the national economy. The social impact of dairy farming has received much less attention. In order to complete an analysis considering three pillars (environment, economic and social) of sustainability for Irish dairy farms, the social impacts of the life cycle of milk production must be better understood. The Irish dairy sector is subject to a policy to increase productivity by 50% by 2020. The social impact needs to be minimized to achieve sustainable production. In this study the social implication of Irish dairy farms was assessed by using the social life cycle assessment methodology defined by UNEP/SETAC S-LCA guidelines. The function unit was 1 t ECM (energy corrected milk) and system boundary was from “cradle to farm gate”, which defined the main stakeholders: workers (farm owner and employed), the local community (also encompasses the workers), wider society and value chain actors. Twenty social criteria were identified across these four stakeholder categories. The study focused on quantitative indicators such as health and safety, working time and wages to aggregate the social impacts over the life cycle of milk production. The primary datasets used were the National Farm Survey (foreground) and the Life Cycle Working Environment database (background), supplemented by Irish national data (Central Statistics Office, Health and Safety Authority, Bank reports, Government Statistics) and international data (International Labor Organization and OECD). Preliminary results showed a great health and safety issue (fatality rate could be 8 cases/1000 million euro of milk produced) in dairy sector. With information about the social impacts of milk production, farmers and policymakers can make decision to improve the social performance of dairy farm to achieve more sustainable production.

How assessment criteria and indicators are defined and selected in Social LCA: a literature review

Tuesday, 14th June - 10:30 - PS-1.02 - Posters - Knaffel gym - Abstract ID: 13 - Poster

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Despite research since 2000 and the publication of Guidelines for the Social Life Cycle Assessment of Products (S-LCA) (Benoît and Mazijn 2009) as a framework for the application of S-LCA, several methodological challenges remain for S-LCA. These challenges include the setting of system boundaries, matching the method to the LCA framework, the coverage of the assessment in terms of criteria, and the effective assessment of impacts.

Much attention has been paid to how performances or impacts should be measured (i.e. life-cycle impact assessment phase), or are measured in existing S-LCA studies (Parent et al. 2010; Wu et al. 2014; Chhipi-Shrestha et al. 2014), but there remain some issues to be addressed regarding what is to be assessed. In any assessment it is necessary to set a framework including assessment criteria, i.e. variables which serve to enable a judgment to be made over the object to be assessed, and the indicators to be used to measure and assess the criteria (Lairez et al. 2015). We propose here to address these issues for S-LCA.

A literature review is conducted below aimed at understanding how the criteria to be assessed and corresponding indicators are selected in different S-LCA frameworks and case studies. First, various general S-LCA frameworks are reviewed. Next, according to how the criteria and indicators (C&I) are defined, these frameworks are characterized and classified. S-LCA case studies with a focus on food and agricultural products are then reviewed and analyzed, by identifying which S-LCA framework is used. Finally, it is verified whether these studies adapted the C&I proposed by the S-LCA framework used, and, if so, how.

Analysis of relationship between operational performance and supply chain sustainability: A case of logistics service providers in Finland and Russia

Tuesday, 14th June - 10:30 - PS-1.03 - Posters - Knaffel gym - Abstract ID: 51 - Poster

Ms. Mariia Murasheva¹

¹NOVA School of Business and Economics

The ever-increasing trend in globalization and customer orientation requires a logistics-sensitive organization. Integration of supply chain management with sustainable dimension is one of the key trends behind sustainable development of businesses. Previous research papers explore supply chains of apparel or manufacturing companies, but there are a few investigations of logistics companies through road freight transportation. Moreover, there is no research concentrated on cross-country analysis in this field. The main goal of this research paper is to explore the relationship between operational performance and supply chain sustainability metrics in case of Finnish and Russian road freight transportation companies. The research objectives of this paper is (1) to study the impact of operational performance measures on environmental company's performance and vice versa; (2) to explore whether there is significant difference in operational and environmental performance between Finnish and Russian road freight transportation companies; (3) to develop a model that can be further used by management team for self-estimation on company's performance in environmental and operational dimensions. 91 Finnish and Russian road freight transportation companies were taken as sample for investigation by multiple linear regression analysis and t-test for two independent samples analysis. The main result is the model that shows relationship between particular operational and environmental characteristics of the company's performance. Conducted analysis showed that limiting transportation and other operations related waste and noise pollution can be achieved by improving "offering short delivery lead-time" operational performance characteristic; decreased consumption of hazardous/harmful/toxic materials lead both to providing higher customer satisfaction rating and lowering customer complaints (percentage of total sales). Customers value companies that get rid of hazardous materials in their operations and, furthermore, if a customer is not aware of the environmental practices of the company, he can switch to a competitor. Significant difference between environmental and operational measures in Finnish and Russian road freight transportation companies was determined. Finnish companies evaluate themselves higher on environmental characteristics whether Russian logistic service providers feel themselves confident in operational ones. This research paper contributes both to theoretical and practical literature on sustainability theme in service industry. From theoretical point of view this study broadens industries that were considered as earlier works concentrated mainly on manufacturing examples and not service providers. Managers of logistics companies may use results of the paper to get understanding what initiatives in operational performance should be invested in to get competitive advantage in environmental terms and vice versa.

Integrating Risk Assessment into LCA: S-LCA Framework for Building Product

A Framework for Integrating Risk Assessment into S-LCA

Tuesday, 14th June - 10:30 - PS-1.04 - Posters - Knaffel gym - Abstract ID: 74 - Poster

Ms. Rebecca LeBlanc¹, Mr. George Thompson²

¹LCA Resource/SSC, ²Chemical Compliance Systems

The building product market in the US and internationally is being increasingly obligated to provide transparent data related to both its environmental and social impacts along the entire supply-chain. With the Lumber Liquidators flooring recall, building product specifiers (architects and designers) and building occupants are also demanding more trustworthy and quantitative information about building products used. Environmental information is being disclosed via an Environmental Product Declaration (EPD), which, uses as its source document, an environmental lifecycle assessment (E-LCA). Quantitative human health and safety data are not usually incorporated into either E-LCAs or Social Lifecycle Assessments (S-LCA). Unfortunately, for building product manufacturers, there are limited methodologies available to assess the risk to human health and safety for incorporation into either E-LCAs or S-LCAs.

Different organizations have started efforts assessing only hazards for E-LCAs, without consideration of exposure controls and constraints, and other factors that can attenuate hazard concerns to the point that there are no risks from the intended usage of the product. This oversimplified and non-scientific hazard-based approach results in manufacturers and consumers (product users) unable to make informed decisions regarding their potential for exposure under the intended use conditions. In addition, hazard only data results in inaccurate and misleading data being incorporated into E-LCAs and S-LCAs, which in turn results in less meaningful EPDs.

We have recently demonstrated that transparent and quantitative lifecycle risk assessment data can be incorporated into E-LCAs, thereby providing site/process/product-specific data that improves the specificity and credibility of E-LCAs. This presentation will demonstrate how this same risk assessment data can also be incorporated into S-LCAs to quantitatively identify negative social impacts at each phase of the lifecycle, and simultaneously document potentially positive social impacts in each Stakeholder Category and Subcategory.

Social and Environmental Life Cycle Assessment Applied to Healthcare Services – A Qualitative Approach

Tuesday, 14th June - 10:30 - PS-1.05 - Posters - Knaffel gym - Abstract ID: 90 - Poster

Ms. Najoua Jouini¹, Prof. Patrick Eagan¹

¹University of Wisconsin-Madison

Companies have been increasingly challenged to evaluate not just their environmental performance but also their social and economic performances. Following the environmental life cycle assessment approach (E-LCA), social life cycle assessment (S-LCA) has been developed to evaluate the social impacts that emerge during the life cycle of a product or a service. Despite the recent increasing publications by S-LCA practitioners, there is still no standardized methodology for selecting stakeholders, impact categories, subcategories, and indicators as well as assessing the impacts. In addition, many case studies focus on products and less on services. The stakeholder “consumers” has also not been considered in most of the studies. In healthcare, patients, as “consumers”, are key stakeholders and the center of the still evolving concept of sustainable healthcare. Quality of life, wellbeing, disease prevention, home treatment, disease self-management, and access to treatment are some of the measures that emerged under the sustainable healthcare umbrella, especially in the treatment of chronic diseases. These needed changes from conventional healthcare entail economic, social and environmental tradeoffs. To understand the tradeoffs decision makers need more comprehensive frameworks and tools to help them evaluate the new dynamics, make informed choices and create more value to a broader set of stakeholders. This research presents a new application of S-LCA, healthcare services - specifically renal therapy services, with a focus on the stakeholder “consumers” - patients. The aim is to outline a methodology to identify and select impact categories, subcategories and indicators to assess the social impacts. The research compares two types of renal therapy services, in-clinic and home therapies, using a qualitative methods approach, focus groups and in-depth interviews. In addition, the assessment incorporates data from a previously conducted E-LCA for both therapies. The information extends the set of stakeholders studied to include local community and society. The results will provide insights to decision makers, such as healthcare service providers and product manufacturers, on social risks and benefits of in-clinic and home therapies; and the implications for a broader set of stakeholders. This activity is seen as a way to advance economic opportunities, add value to patients and contribute to product stewardship.

Keywords: S-LCA, qualitative methods, healthcare services, chronic diseases, sustainability, decision-making

Updating data in a generic social LCA database

Tuesday, 14th June - 11:00 - OS-3A.01 - Inventory databases and impact assessment methods -
Knaffel gym - Abstract ID: 66 - Oral

Dr. Andreas Ciroth¹, Ms. Franziska Eisfeldt¹

¹GreenDelta

It has often been stated that Social LCA data is difficult to collect, to assess, and that it “decays” faster than natural-science based data which environmental LCA aims for.

For a comprehensive, generic social LCA database, it is essential to update the information regularly. For an update, several cases can be distinguished; including:

- Availability of more recent or otherwise “better” information;
- Availability of additional information for data that exists already in the database; for example, information about a specific indicator in a country and sector, from a different source
- Availability of data on a different level than previously existing in the database, e.g. a more detailed sector, a product

Each of these cases has different implications; the 3rd being the most complicated. These implications and the effect of these updates will be presented for the PSILCA database.

In the second part of the presentation, the infrastructure for updating the database will be presented and discussed. This infrastructure consists of “data pipelines” established for the database, to capture major sources of social data which are increasingly available, but covers also input from social LCA projects and other sources. Various needs and specificities of these different sources will be presented and discussed, by help of examples.

The presentation ends with an invitation to join the database as data provider; making the point that probably social LCA databases should always be “interactive” to reflect the volatility and diversity of social information.

Proposition of a scoring method for the S-LCA assessment phase

Tuesday, 14th June - 11:00 - OS-3A.02 - Inventory databases and impact assessment methods - Knaffel gym - Abstract ID: 46 - Oral

Mr. Breno Carmo¹, Prof. Manuele Margni¹, Prof. Pierre Baptiste¹

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The current method used to score the performances at the assessment phase in social life cycle assessment (S-LCA) presents some implicit assumptions that can generate or improve the errors at the final aggregated results. There is no problem related to the qualitative analysis point of view. However, this is not true for the quantitative assessment. The Performance Reference Point (PRP) technique is used to establish the Classification Levels (CLs) of the subcategories indicators and the linear value function is normally used to score the CLs. Nevertheless, we cannot guarantee that they follow a linear behavior considering the complexity of the subcategories indicators. This means that the basic requirement of one indicator is not necessarily valued in the same way than another because each subcategory presents some singularities that must be considered at the scoring phase. Actually, this aspect is not contemplated in S-LCA studies. This gap makes the use of social assessment to support decision-making a challenge.

This paper aims to propose a method to establish a customized function value to quantify the CLs' of the subcategories indicators based on the value judgment of a focal group formed by experts in S-LCA.

Two phases compose our research. Three steps characterize the first phase: (i) the definition of the focal group; (ii) the data collection and analysis and (iii) the definition of the value function shape for each subcategory indicator. At the second phase, we apply our method to present how it can be used in S-LCA studies.

It was possible to observe that when we modify the shape of the value function, the final performance changes. This result proves that the shape of the value function can influence the decision-making process. This research fulfilled the current gap at the assessment phase of S-LCA by proposing a method to score the classification levels of the subcategories indicators. It allows a more precise performance considering the complexity of the indicators used to measure the social impacts. The customization of the value function can provide a precision improvement of the performances results. This model can be used for all types of product systems. By the framework application on a hypothetical case, we can conclude that it is possible to obtain a more precise quantified performance.

Combining SHDB with Ecoinvent: A new tool for LCSA

Tuesday, 14th June - 11:00 - OS-3A.03 - Inventory databases and impact assessment methods -
Knaffel gym - Abstract ID: 17 - Oral

Dr. Catherine Benoit¹, Dr. Gregory A Norris², Dr. Gregor Wernet³, Ms. Tereza Levova³

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1. Context

Life Cycle Sustainability Assessment (LCSA) combines techniques and data (E-LCA, S-LCA and LCC) to evaluate environmental, social and economic negative impacts and benefits throughout life cycle. Until now practitioners had to conduct each assessment separately. The ecoinvent database is a world-leading database of consistent, transparent, and up-to-date Life Cycle Inventory (LCI) data. The Social Hotspots Database, produced by New Earth, is the first comprehensive database for Social LCA.

2. Objectives

The purpose of a new project involving the Ecoinvent center and New Earth was to see if, and how, the social risk tables contained within the Social Hotspot Database (SHDB) could be re-purposed for use directly within the ecoinvent database, so that life cycle assessment practitioners could assess both social and environmental impacts using a single integrated database.

3. Methodology/approach

The social risk data in the SHDB are assigned to (and reflect the attributes of) country-specific sectors; these data tend to provide global coverage, addressing over 200 countries and regions. By contrast, unit processes in the ecoinvent database are at the level of engineering processes or activities at a higher level of aggregation, and in many cases, there are chains or “sub-trees” of consecutive processes which all occur within a given sector. In this project, we made use of international trade data, together with the new (to ecoinvent 3) convention of modeling markets and using “rest of world” processes in the Ecoinvent database, in order to provide the bridge necessary for applying the risk tables within the ecoinvent database. Commodity price data were also needed and used in order to complete the integration.

4. Findings and contributions.

Ecoinvent unit processes now include risk level data on over 130 indicators. This can make it possible to assess jointly the environmental and social impacts of product life cycles. We demonstrate applications of the new database, compare results with those obtained from using the SHDB and ecoinvent databases separately, summarize some of the strengths and weaknesses of the new data capability, and discuss how the field of social LCA can proceed to continually enrich the detail and coverage of country-specific risks within integrated environmental and social LCA databases.

Social Indicators

Tuesday, 14th June - 11:00 - OS-3B.01 - Evaluating and improving supply chain impacts on human health and human well-being 2 - 1 Story street, Room 304 - Abstract ID: 59 - Oral

Ms. Tamara Popovic¹, Dr. Ana Carvalho², Prof. Andrzej Kraslawski¹, Prof. Ana Póvoa³

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Increased interest for sustainability reporting provoked both, companies and academies to deepen their research in sustainability and therefore on sustainability indicators. Special attention is devoted to the social sustainability due to lack of knowledge about this aspect, but also because of increased stakeholder's pressures and awareness about the possible social impacts along the supply chains. Despite the diversity of the existing methods, the assessment of social sustainability of supply chains still remains a significant issue. Consequently, this research proposes a set of indicators for assessing social sustainability of supply chains. Taking into account the traditional definition of supply chains, where a set of companies operate together in an echelon's structure, the aim of this research is to enable the assessment of social sustainability within the supply chain, considering the differences that exist within the different echelons. Therefore this work considers dividing the supply chain in three main generic echelon levels – upstream, midstream and downstream. The methodology of this work is built up on the work of Simões et al., 2014, where sixteen social impact categories were identified as the most suitable categories to assess supply chains. The set of quantitative social sustainability indicators are assigned to the sixteen social impact categories accordingly to their echelon level. The validation of the proposed set of quantitative indicators is performed through a content analysis of 142 sustainability reports containing companies of all echelons. The obtained results give clear definition of echelons and social sustainability indicators depending on the echelon level. Additionally, the results help practitioners to support collaborative improvement of sustainability along the supply chain.

Social Life Cycle Assessment of milk production: a comparative analysis between China and Italy

Tuesday, 14th June - 11:00 - OS-3B.02 - Evaluating and improving supply chain impacts on human health and human well-being 2 - 1 Story street, Room 304 - Abstract ID: 56 - Oral

Dr. Gabriella Arcese¹, Ms. Chongyang Du², Prof. Maria Claudia Lucchetti¹, Ms. Iliaria Massa³, Prof. Cassia Ugaya⁴

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Socio-economic impacts of a product life cycle are strongly dependent by the cultural and institutional characteristics of the place the production is settled. The complexity of the analysis and the lack of data have greatly hindered the production of SLCA comparative analysis. Applying the methodological path provided by the UNEP/ SETAC reference documents, we analysed the social impacts associated with of milk production in China and in Italy in order to highlight the differences in outcome of the two analysed Country Systems.

This article aims to identify the major social hotspots in the supply chain of milk production, and then assess the risk levels of social impacts on the basis of the characteristics of the analysed national environment. We considered the life cycle as composed by four steps: milk production, milk processing, access to market, usage. For each life cycle step we implemented a twofold literature review analysis in order to highlight the main social hot spots. First, we collected relevant literature on electronic library through the use of keywords and we conducted a content analysis in order to identify the general social hot spots. Then, we integrate the general results with site specific information provided by national/ regional grey literature and with the social risks identified by using the Social Hots Spot Database.

Preliminary results of the social risks for workers employed in the milk production step are presented, highlighting the differences between the two countries. Finally it is provided a detailed list of indicators suitable to assess the selected impact categories.

A method to evaluate lean manufacturing influence on product social sustainability: a quantitative SLCA

Tuesday, 14th June - 11:00 - OS-3B.03 - Evaluating and improving supply chain impacts on human health and human well-being 2 - 1 Story street, Room 304 - Abstract ID: 32 - Oral

Mr. Fabio Gregori¹, Dr. Marco Mengarelli¹, Prof. Michele Germani¹

¹Università Politecnica delle Marche

The reduction of waste is a core topic that involves each industrial process on a global scale. Industry has a crucial role in the game of waste reduction: larger lots of more efficient products have to guarantee less raw materials usage, less scraps and a very low use of energy. Following this goal, the lean manufacturing system sets its focus on the identification of production waste in order to implement effective actions on the production system for a more efficient production. Tools and methodologies embedded within lean production have a main shared player that needs to be taken into account: the human contribution. Lean philosophy in fact, focuses on the involvement of a physical person in each corrective action taken toward production efficiency. Results are new actions and procedures that employers have to deal with. It is then important from a social sustainability point of view to understand how these actions are really collected by the core force of a lean framework, namely the employers. In the literature, different research studies that assess lean manufacturing approach in terms of environmental sustainability and cost reduction can be found but only a few refers to the social sustainability issue. This paper wants to boost the discussion about the social effects of lean manufacturing, understanding real relapses on humans. After a description of lean philosophy milestones and more specifically the idea of lean manufacturing, this paper will analyze the lean manufacturing system of an Italian production plant with the aim to perform a quantitative Social Life Cycle Assessment (SLCA) for a product developed according to lean principles. Here stakeholders related to a household appliance production will be taken into account namely the production line workers. The final scope is to understand if efforts made for reducing waste in the name of the lean manufacturing are sustainable for people that implement new actions on a daily basis. The SLCA here is performed through a new method, shown in a previous work by the authors, that sets its basis on the UNEP/SETAC framework. Analysis through the mentioned method will be performed developing customized surveys for the SLCA analysis: results are shown in a quantitative manner in order to obtain a measurable index to deeply understand effects of lean philosophy on humans involved in the manufacturing kaizen process.

Social LCA of Life Extension Options for Truck Tires in Brazil

Tuesday, 14th June - 14:00 - OS-4A.01 - Supporting supply chain due diligence on human and labor rights with Social LCA 2 - Knaffel gym - Abstract ID: 48 - Oral

Mrs. Luce Beaulieu, M.Sc.¹, Mrs. Sara Russo Garrido¹, Dr. Jean-Pierre Revéret¹

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In 2014, the CIRAIG's International Life Cycle Chair (Polytechnique Montreal/ESG UQAM) completed a joint environmental and social LCA mandate for Michelin. The object of these environmental and social LCAs was to carry out a study of the useful life extension of truck tires in Brazil, specifically as it pertains to the practices of retreading and regrooving.

With this goal in mind, four use scenarios were developed and a functional unit was determined. For the Social LCA part of the study, the main goal was to assess the issues and impacts arising from the behaviour of companies associated with the life cycle of truck tires. Secondary goals were to provide a global hotspot portrait of social issues over the entire life cycle, as well as a more precise portrait of the “retreading” and “end of life” stages which occur in Brazil. The Social LCA study mobilized various types of data, data collections and types of evaluation, creating a hybrid Social LCA methodology. Primary, secondary and generic data were all used in order to better capture the specifics of various life cycle stages. The Social hotspots database (SHDB), performance reference points (PRP) and a data quality evaluation methodology were used to analyze data and provide an evaluation of the social performance of companies within the life cycle. Two types of recommendations were provided: first, strictly on the basis of the main social hotspots for the Social LCA; second, jointly with the environmental hotspots, in order to present recommendations which would avoid creating impact transfers from one dimension to the other.

This study was one of the most ambitious projects to mobilize both the social and environmental teams of analysts and was a fertile ground for methodological development for both performance/impact assessment and for the development of extensive and joint recommendations between the two dimensions of sustainability. It entailed many methodological developments, namely related to the challenge of combining various data collection and analysis. It also gave rise to a workshop, which was carried out by a class of students of the strategic ecodesign graduate program (Faculté d'aménagement de l'Université de Montréal and HEC Montréal). Some sneak peeks of these ecodesign solutions will be premiered during the presentation.

Social Life Cycle Assessment of cellulose produced in Canada

Tuesday, 14th June - 14:00 - OS-4A.02 - Supporting supply chain due diligence on human and labor rights with Social LCA 2 - Knaffel gym - Abstract ID: 70 - Oral

Mr. Roberto Hernandez¹, Dr. Getachew Assefa¹

¹University of Calgary

Context

The pursuit of innovation of the Canadian forests industry has led them to undertake collaborative and multi-disciplinary work that have brought academic, government and researchers together through a Value Chain Optimization Research Network.

One aspect of this Network refers to the comprehensive considerations of social performance of forest-based products beyond those commonly adopted frameworks such as forest certifications. As a result, we are involved in the development of a sector profile of virgin wood pulp (cellulose) produced in Canada through a Social Life Cycle Assessment (SLCA).

Objectives

The overall goal of this investigation attempts to increase our understanding of the social effects of cellulose production in Canada as well as to document methodological and practical implications of adopting an SLCA approach.

Methodology/approach

This investigation adopts the United Nations Environmental Programme guidelines and applies a sectorial methodological approach similar to Revéret, Couture, & Parent (2015). We build a sectorial profile for foreground processes and identified potential hotspot upstream of the value chain (background).

In phase one, we reviewed scholar and gray literature to understand the social effects and the context of cellulose production in Canada.

In phase two, we defined the studied system including modeling requirements such as description of physical system and SLCA product system. This also included the definition of stakeholder categories, impact subcategories and inventory indicators for the site specific and generic assessment. Performance reference points (PRP) and evaluation scales were also adopted to assess the performance of the product system.

In phase three, we developed and pilot a questionnaire for data collection to cellulose producers, obtained ethic board approvals, and submitted instruments for collection of inventory data.

In phase four, we considered the database PSILCA for the identification of potential hotspots upstream of the value chains.

Findings and contributions

We propose 13 impact subcategories and 27 indicators for the site-specific assessment. We adopt 17 impact subcategories and 47 indicators from PSILCA database for the generic risk assessment. Although the site-specific assessment indicates an overall proactive behavior among wood pulp manufactures, community engagement through access to material resources requires further improvement. The hotspot assessment indicates that human rights issues faced by indigenous people, migration and certified environmental management systems should be the priorities for improving the wood pulp system. Contributions in medium risk hours by country and sector are also presented.

Products sustainability information: social impacts assessment and communication

Tuesday, 14th June - 14:00 - OS-4A.03 - Supporting supply chain due diligence on human and labor rights with Social LCA 2 - Knaffel gym - Abstract ID: 29 - Oral

Dr. Fayçal Boureima¹, Ms. Julie Godin¹, Ms. Bettina Heller¹

¹UNEP-DTIE

The 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP) is a global framework of action to enhance international cooperation to accelerate the shift towards Sustainable Consumption and Production (SCP) in both developed and developing countries. It was adopted at the 2012 United Nations Conference on Sustainable Development (Rio+20). The Consumer Information Programme (10YFP CIP) is a 10YFP programme aiming at enabling sustainable choice by consumers through the provision of accessible, reliable and verifiable sustainability information. Life cycle approach is an important area of work under the programme.

In this study - focusing on social impacts assessment in products sustainability information - the main developments, gaps and best practices in relation to social indicators, methodologies are assessed across the life cycle of products. Recommendations for work to be undertaken under the 10YFP Consumer Information Programme (10YFP CIP) are also provided in order to improve the communication of social benefits and risks to consumer.

Some of the most common product sustainability information tools namely ecolabels, self-declared environmental labels, environmental declaration and voluntary sustainability standards (VSS) are considered in this study. The selected tools are then assessed against five criteria, namely the covered social areas, the life cycle perspective of the social information, the involvement of stakeholders in the development of the tool or selection of sustainability criteria, third-party verification and the display (i.e., communication) of the products sustainability information. This analysis has revealed that the social assessment of products through product sustainability information tools is mainly limited to the production and the processing phases, and only the impacts on the workers and the local community are considered, excluding users and end of life exposures. Moreover, the social assessment of products is most of time limited to a compliance verification against a list of criteria instead of specific indicators allowing to measure the performance of products. Finally, different social metrics and social data sources are evaluated in order to provide recommendations to integrate these practices in product sustainability information to better assess the socio-economic benefits and risks communicated to consumers.

In conclusion, recommendations for future actions in terms of communication, harmonization, data and methodology to better inform consumers on the sustainability performance of products are provided.

Social impacts of Finnish forest bioeconomy: discussion on usability of different tools

Tuesday, 14th June - 14:00 - OS-4B.01 - Knowing and growing social handprints (positive impacts)
2 - 1 Story street, Room 304 - Abstract ID: 16 - Oral

Mr. Jachym Judl¹, Dr. Pekka Leskinen¹, Dr. Catherine Macombe²

¹Finnish Environment Institute SYKE, ²Irstea

Context

Any human activity causes social impacts and those can be both negative, as well as positive. The growing global awareness of social impacts creates a demand for their quantification (Macombe et al., 2013; Norris, 2006). This is also true within the forest industry. However, different sectors can be very different by nature and that may cause difficulties in using standardised approaches and databases (Bocoum et al., 2015).

Objectives

Forest-based industries, and forestry itself, play an important role in Finnish bioeconomy. As a resources-intensive sector, forestry is often under the scrutiny for its impacts to the society. While some social impacts of forestry, and related industries, could be illustrated for example with the Social Hotspots Database (SHDB) (Benoit-Norris et al., 2012), the main social impacts (both negative and positive) are quite often local and difficult to quantify.

Methodology/approach

In the so-called FORBIO research project our aim is to assess environmental, economic and social sustainability as well as acceptability of climate-neutral and resource-efficient forest-based bioeconomy in Finland. As background information, harvesting of Finnish forests is currently below the forest growth so that cuttings could be increased without risking future cutting potential. However, more intensified forest biomass utilization may interfere e.g. with other uses of forests, which must be taken into account in comparative assessment.

In order to do so, different national level bioeconomy scenarios, and company level case studies, are developed and performed in the project. Various existing tools are used to assess the sustainability of wood procurement and its processing into products including new high value-added products such as wood-based chemicals.

Finally, different approaches to assess social (as well as environmental and economic) impacts of the forest-based bioeconomy are utilized. These involve, but are not limited to, the use of the SHDB, decision analysis as previously applied e.g. in Myllyviita et al. (2013), the Finnish environmentally extended input-output model ENVIMAT and comparative and quantitative methods for assessment of social impacts (Macombe (coord.), 2013)

Findings and contributions

We evaluate and compare the alternative approaches to measure social impacts of forest-based bioeconomy. We present the preliminary findings of, and preconditions for, such assessment. Moreover, we raise a discussion on social handprinting in Finnish forest-based bioeconomy. Such aspects as local employment or recreational function of forests are inherently connected to this sector and as recently identified by Alhola (2015), Finnish companies are interested in quantifying their handprints.

Social Life Cycle Assessment of production of energy efficient household fans for a developing nation: A case study based on UNDP-GEF's BRESL project

Tuesday, 14th June - 14:00 - OS-4B.02 - Knowing and growing social handprints (positive impacts)
2 - 1 Story street, Room 304 - Abstract ID: 69 - Oral

Dr. Humera Farah¹

¹Associate Professor, Department of Earth and Environmental Sciences, Bahria University, Islamabad

The United Nations Development Program (UNDP) and Global Environment Facility (GEF) have jointly launched Barrier removal to the cost-effective development and Implementation of Energy efficiency Standards and Labeling (BRESL) project for five developing Asian countries, including Pakistan. The project aims to aid the manufacture, sales and usage of energy efficient electrical appliances through regional cooperation. Also, it provides assistance to each participating country, for establishing or expanding its Energy Standards and Labeling (ES&L) programs. Pakistan has a substantial electric fan manufacturing industry for both local and export market, hence it has prioritized to develop and implement ES&L for electric fans through BRESL program. The goal of the present investigation was to compare the social barriers and impacts of design and manufacture of energy efficient (class I, for which BRESL program underway) versus non-energy efficient (class II) fans. The study was conducted using guidelines for Social Life Cycle Assessment (SCLA) of products, developed by United Nations Environment Program (UNEP). Household ceiling fan (for both classes, I and II) manufactured in fan industry hub of the country, Gujarat, was selected as the functional unit. The positive social impact of energy efficient fans was reflected as their contribution towards reducing the national electricity shortfalls and enhancing development. However, some negative impacts were also revealed during production of both classes of fans, i.e. health and safety, socio-economic issues and human rights. The fan industry was found divided over manufacturing the energy efficient fans due to economical consideration, i.e. small enterprises reluctant towards producing the efficient equipment due to its expensive raw material. Nevertheless, the National Energy Conservation center, ENERCON, a federal government entity responsible for implementing BRESL program, promulgated Minimum Energy Performance Standards (MEPS) and has initially introduced voluntary labelling on electric fans to be sold in the country. An Environmental Life Cycle Assessment in parallel with SCLA should also be conducted due to few negative environmental impacts of this industry.

Positive aspects in a Social Life Cycle Assessment of a handicraft product: the case study of a wheels of semisoft juniper-smoked ricotta cheese

Tuesday, 14th June - 14:00 - OS-4B.03 - Knowing and growing social handprints (positive impacts)
2 - 1 Story street, Room 304 - Abstract ID: 62 - Oral

Mrs. Monica Serreli¹, Mrs. Manuela Cozzi², Ms. Alessandra Zamagni³, Prof. Luigia Petti¹

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Context

In Italy handicraft products are important drivers of the economic growth, and key elements that distinguish the Italian creative and design activities production worldwide. These products are made mainly by hand, and are characterized by a short and traceable supply chain, the presence of non-traditional business models (e.g. social innovation). Moreover, they distinguish themselves for their uniqueness, the bond with the territory and with the traditions, and particularly for their quality, all aspects that make them not directly comparable with products of the same category.

The increasing concerns by consumers about the potential social and socio-economic impacts of products has driven an increasingly number of publications of Social LCA (S-LCA) studies in the last years. However, among the studied products, the handicraft ones have not been addressed so far to the best knowledge of the authors.

Objectives

This paper aims at presenting the application of the S-LCA methodology to the study of a wheels of semisoft juniper-smoked ricotta, with the ultimate goal of capturing the positive effects its production system generates. The product under study is produced in an agritourism-farm located in Abruzzo-Italy, which adopts a business model based on handicraft. The main activity is the breeding of sheep, from which cheese, wool and meat are produced. In-addition, also accommodation, food-service and teaching-farm are services provided.

Method

The S-LCA methodology as structured in the UNEP/SETAC Guidelines has been adopted, with a twofold purpose: i) to test its applicability to such a complex product system; ii) to develop suitable indicators and an approach able to highlight whether and when win-win situation occur (Petti et al., 2014). Among the complexities, the definition of the functional unit is particularly challenging: the peculiarities of the place in which the production takes place (e.g. around 120 aromatic species per sq of grazing land), and the way in which the production process is organized, cannot be captured by setting the functional unit to e.g. 1 kg of cheese.

Findings and contributions

Preliminary findings show that handicraft products, in particular those belonging to the agri-food sector, require a different approach when assessing their potential socio-economic impact, due to the several interdependencies existing between a product, a territory and the actors within. This complexity requires a revised definition of the quality concept, able to embrace a multitude of aspects, and an integrated assessment in which the social counterpart cannot be carried out by a stand-alone methodology.

Process based assessment of working place related social impacts of products – Life Cycle Working Environment (LCWE)

Tuesday, 14th June - 14:00 - OS-4C.01 - Calculating product and organizational social footprints 3
- 1 Story street, Room 306 - Abstract ID: 20 - Oral

Ms. Eva Knüpfner¹, Dr. Stefan Albrecht¹, Ms. Ulrike Bos², Ms. Tabea Beck², Mr. Rafael Horn²

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In recent years the topic of social aspects of value chains has gained increasing attention not only in the LCA research community but also in industries. Questions arise on how social impacts can be measured and assessed to meet compliance requirements and reporting standards especially regarding working conditions and human rights. For these purposes information is required on social impacts of the whole supply chain of products analogue to LCA. Therefore a process based approach to assess social impacts is needed to allow a detailed consideration of relevant indicators regarding their hotspots along the value chain and their geographical location. Latest methods and databases have contributed greatly to advance the feasibility and validity of sLCA. Despite this progress major challenges are still ahead. Two of these challenges are data availability and the referencing to processes or to the functional unit respectively. The department of Life Cycle Engineering developed a sLCA method called Life Cycle Working Environment (LCWE) to address these specific issues. The basic idea of the LCWE approach is to combine economic information included in product system models with either statistical data or primary data to calculate social profiles of processes. The assignment of processes to branches is taken as a basis. According to this assignment statistical data can be accounted on the process. The link is operationalized by allocating the statistical information to the process by the ratio of the value added to the working time needed for a process. This operation is based on the assumption that social impacts occur proportional to working time and that working time is proportional to the value added of a sector.

The process based results can then be aggregated along the value chain creating an overall social profile of the assessed product. The data base used for LCWE has recently been updated using statistics from EUROSTAT. The structure and data is compatible to GaBi LCI data. First case studies conducted confirm the applicability of the method. It allows the process based evaluation of workplace related social issues along the whole value chain by combining primary and secondary data. Socio-scientific questions such as consumer satisfaction or acceptance related to the use phase are out of scope of the method.

Using product system models as a basis for the assessment of social impacts shows great advantage, as LCA, LCC and LCWE can be evaluated within the same system models including boundaries and scenarios.

A Flexible Tool for social LCA incl. aspects of environmental damage and added value

Tuesday, 14th June - 14:00 - OS-4C.02 - Calculating product and organizational social footprints 3
- 1 Story street, Room 306 - Abstract ID: 58 - Oral

Mr. Adrian Haas¹, Dr. Stephan Pfister¹

¹ETH Zurich

1.Context

SLCA still faces the issue of how to best quantify the results for ease of analysis in comparative assessments. The SHDB has been implemented in various software as an operational tool. However, it remains at the level of work hours at different risk levels, which is difficult to evaluate. While LCA is quantifying and aggregating different environmental concerns, SLCA still needs guidance on how to best do this.

2.Objectives,

The objective is to provide a flexible tool that allows quantifying both, work hours and aggregated risks, allowing for many choices on the selection of risks and weighting of risk levels. Furthermore, the goal is to include other aspects such as social benefits from added value and social impacts from environmental damage, to broaden the analysis from-work hour related impacts to a more complete view on the whole society.

3.Methodology/approach,

In order to account for environmental stressors and added value, we used the MRIO database Exiobase v2.2.2, which is to a large extent compatible with the GTAP MRIO model underlying the SHDB. The sector and country match for risks of SHDB and Exiobase is already included in the tool allowing to link risks with added value results as well as environmental impacts of most important stressors, based on a single system model. The tool is programmed in “python” and includes predefined selection and weighting sets for quantifying the different social impacts. However, since more research is needed in this field, the tool allows selecting custom values to adjust the social impact assessment. Additionally, the tool also displays the results of working hours, added value and environmental impacts without risk weighting. Optionally, we included normalization in order to better compare the results of the three dimensions working hours, added value and environmental damage.

4.Findings and contributions.

We applied the tool to T-shirt production and sale systems and found that it is relevant to account for different aspects of social impact, since the three dimensions showed a different picture. Obviously the added value occurs mainly in the sales sector (mainly Germany in our cases), while impacts related to environment and work hours occurs in the cotton and textile producing countries (Bangladesh and the US in our cases). Since the tool is freeware, it will help researchers to further test different quantification schemes, but also allow practitioners to analyze product systems with pre-defined or custom selection and weighting sets.

The corruption footprints of nations

Tuesday, 14th June - 14:00 - OS-4C.03 - Calculating product and organizational social footprints 3
- 1 Story street, Room 306 - Abstract ID: 43 - Oral

Ms. Yanyan Xiao¹, Prof. Manfred Lenzen¹, Dr. Catherine Benoit², Prof. Gregory A. Norris², Dr.
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Corruption is a global and multidimensional problem caused by a combination of economic, political and social factors. The existing research shows that corruption levels in different countries are correlated, indicating that corruption occurring in one country may have repercussions for corruption in other countries. Since corruption generally hampers international trade, we apply multi-regional input-output (MRIO) method to link corruption impacts to economic and social aspects of trade, in order to analyse the global links between the social problem corruption in one place and individual consumers' behaviour elsewhere, thus making it possible to find avenues for tackling the problem that are not usually considered in anti-corruption strategies.

We calculate corruption footprints of 189 nations and show commodity details of corrupt sectors. Every country's corruption footprint includes its domestic corruption and the corruption imported via global supply chains to meet final demand. Our results show that generally the net corruption exporters are developing countries, but Italy is an exception. China is the largest gross corruption exporter, and clothing is the most corruption-intensive commodity. Our results can be useful to community groups, NGOs and policy-makers for developing consumer guidelines, regulations and laws to combat corruption.

The COSY food project: assessing the sustainability of Alternative Food Networks in Belgium

Tuesday, 14th June - 15:30 - PS-2.01 - Posters - Knaffel gym - Abstract ID: 42 - Poster

Ms. Solène Sureau¹, Prof. Tom Bauler¹, Mr. Florian Delespesse², Mr. Alexis Descampe³, Ms. Aurélie Labarge⁴, Ms. Anaïs Pauwels⁵, Dr. Jérôme Pelenc¹, Dr. Grégoire Wallenborn¹, Prof. Wouter Achten¹

¹Université libre de Bruxelles (ULB), ²Réseau des GASAP asbl, ³Färm.coop scrl, ⁴La vivrière scrl, ⁵Delhaize sprl

Over the last decade new food production and distribution models have emerged in Belgium in opposition to the mainstream food system. Organic farming, short supply chains and locavore regimes, generally called alternative food or agrifood networks (AFNs/AANs), have been developed to reduce environmental impacts, provide fairer prices for farmers, maintain local jobs and offer healthier food (Forssell and Lankoski 2014). However, Redlingshöfer (2006) draws attention to the distribution inefficiency of AFNs which may reduce the environmental benefits, while Tregear (2011) questions the socioeconomic advantages of AFNs. In addition, few evaluation studies of these initiatives consider all dimensions of sustainability and have an integrated approach (Bouroullec et al. 2014).

The COSY (consumer-oriented systems of food provision) food project originates from these general observations and the specific assessment needs of four Belgian AFNs that are partners in the project. The general aim of this project is to build a specific life-cycle sustainability assessment (LCSA) tool to evaluate integrated food production–distribution–consumption systems in Brussels. The LCSA (Valdivia et al. 2011) method is currently being developed and combines environmental life-cycle assessment (E-LCA), life-cycle costing (LCC) and S-LCA, the latter serving to assess social and socioeconomic impacts, also currently under development. This abstract and a related poster present the overall aims and approach of the project and seek to stimulate discussion with peers.

The project's first aim is to develop a common definition of the sustainability of AFNs, including identification of sustainability criteria and indicators. This will be undertaken in a participatory manner with the project partners and their respective stakeholders (consumers, producers etc.). As suggested by Mathe (2014), it will be done with the support of the Principles, Criteria and Indicators framework, which allows participants to express their preferences in a structured way. Indicators identified or developed during these exercises will then be integrated in the LCSA framework. The separate E-LCA, LCC and S-LCA methods will each be developed to meet the expectations of the project partners and the stakeholders. The project will also address some of the remaining methodological challenges in relation to the S-LCA and LCSA methods: the definition of criteria and indicators, the development of an impact assessment method and the integration of results drawn from the three analyses. The tools and methodological developments will be developed and tested by means of assessment of products from the four AFNs.

Systems Thinking in Life Cycle Sustainability Assessment: The Case for Alternative Vehicle Options

Tuesday, 14th June - 15:30 - PS-2.02 - Posters - Knaffel gym - Abstract ID: 50 - Poster

Dr. Nuri Onat¹, Dr. Murat Kucukvar², Dr. Omer Tatari³, Dr. Gokhan Egilmez⁴

¹Arizona State University, ²Istanbul Sehir University, ³University of Central Florida, ⁴University of New Haven

This research aims to advance the state-of-the-art and the state-of-practice of sustainability research by exploring interactions and feedback mechanisms between the environment, economy, and society within the context of US transportation. Systems thinking approach is utilized to reveal the bigger picture, recognize patterns and relationships, and learn how to smaller competent effect one another within the complete entity. System Dynamics modeling is used to model complex interactions among the environmental, economic, and social impacts of US transportation. A total of seven macro level impact categories (global warming potential, particulate matter formation, photochemical oxidant formation, contribution to gross domestic product, vehicle ownership cost, human health impacts and employment generation) are selected for comparing four vehicle options including internal combustion vehicles, hybrid vehicles, plug-in hybrid vehicles, and battery electric vehicles. Extreme customer choice scenarios are tested to reveal the maximum impacts and alternatives are compared. Analysis results revealed that any alternative vehicle option, alone, cannot reduce the rapidly increasing atmospheric temperature and the negative impacts of the global climate change, even though the entire fleet is replaced with the most environmental friendly vehicle option. In addition, the impacts from feedbacks within the society, economy, and the environment are found to be smaller compared to exogenous drivers such as existing and expected trends in population, economy, and global warming. There is a strong need for robust simulation models that would allow us to consider dynamic complexity to mainly understand, not just quantify the sustainability impacts of products.

Data quality assessment in a generic social LCA database, approach and application

Tuesday, 14th June - 15:30 - PS-2.03 - Posters - Knaffel gym - Abstract ID: 65 - Poster

Dr. Andreas Ciroth¹, Ms. Franziska Eisfeldt¹

¹GreenDelta

When using social LCA data for decision support, it is essential to understand its reliability and completeness, and in how far it links to time, the products, and the region of interest.

We will present an approach to assess the data quality for an entire, generic social LCA database, PSICLA, where a data quality assessment approach was first introduced; we will show the development of the data quality assessment over one year in the database, and will of course also show the application.

The application will be a hybrid case study, where the PSILCA database is linked to a process-based social LCA case study, for Turkish organic cotton.

The case study will be explained, and it will be investigated and discussed how far the data quality helps in decision support and in understanding the reliability of the study.

Integrating social aspects into sustainability assessment of biobased industries: Towards a systemic approach

Tuesday, 14th June - 15:30 - PS-2.04 - Posters - Knaffel gym - Abstract ID: 53 - Poster

Mrs. Parisa Rafiaani¹, Prof. Steven Van Passel², Prof. Philippe Lebailly³, Dr. Tom Kuppens⁴, Dr. Hossein Azadi⁵

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Considering its potential impacts on development, biobased industries require to be assessed according to the positive and negative effects they can bring to the society. Typically, the implications of biobased industries are considered in terms of economic, environmental and technical indices while social factors are usually neglected in the majority of impact assessments. This is mainly due to the fact that social issues are not easy to be quantitatively analyzed, measured and monitored. Indeed, the following issues need to be addressed: (i) how the social dimension is understood from different stakeholders' perspective; (ii) how the social pillar can be properly integrated into sustainability evaluation methodologies which are mainly focused on environmental performance and (techno)-economic assessments of biobased industries. This review paper aims to answer these questions firstly through identifying the main social impacts and indicators of the biobased industries at local level in order to find an answer for the second question by analyzing and comparing the current methodologies for assessing social impacts in bioindustries. These methods mainly include Social Impact Assessment (SIA), Socio-economic Impacts Assessment (SEIA) and Social Life Cycle Analysis (SLCA). The latter, although is in its early steps of development, has been considered to have substantially promising methodological attributes for bioindustries' social sustainability assessment. Although ongoing research tackles the incorporation of the environmental dimension into extended techno-economic assessments, no integration of the social pillar into such assessments has been made. Given that, this review focuses on the social dimension for integrated sustainability assessments of biobased industries to assess the main social impacts resulting from each operation or from the bioenergy sector. The current review focuses on the importance of social sustainability indicators and evaluation techniques. By discussing the methodologies for evaluating social impacts, a systemic methodology for assessing and integrating the social dimension into the sustainability assessments of bioindustries is developed, considering the four main iterative steps of an SLCA framework and three useful SLCA-based approaches including Product Social Impact Assessment; Prosuite and the UNEP SETAC Guidelines for SLCA of Products. It is concluded that the term systemic analysis implies that the whole approach needs the capacity to understand different subsystems and relations between them. Accordingly, the systemic assessment of biobased technologies should simultaneously include technological, economic, social and environmental dimensions. The result of this study identifies social impacts in the bioeconomy and particularly highlight the importance of considering social issues in biobased industries' design and innovation.

Social Life Cycle Assessment in the Value Chain: A Pilot Study in Steel Industry

Wednesday, 15th June - 08:45 - OS-5A.01 - Supporting supply chain due diligence on human and labor rights with Social LCA 3 - Knaffel gym - Abstract ID: 73 - Oral

Ms. Ambalika Gupta¹, Dr. Marzia Traverso², Mr. Uday Gupta¹, Mr. Peter Tarne³

¹Mahindra Sanyo Special Steel Pvt. Ltd, ²BMW, ³BMW Group

Steel has always played an indispensable role in the history of any country on the road to growth and development. The social, economic and environmental impacts of the industry have also been acknowledged. Quiet substantial has been said and done to monitor, reduce, check and mitigate the environmental impacts like depletion of the non- renewable resources, acidification, eutrophication, emissions and other related threats. The social impacts that any industry and steel for that matter can cause across its value chain is also acknowledged. It is interesting to undertake a study where the value chain is spread across the geographies from developed to the developing country like that India.

In an attempt to study the social impact of its product BMW & Mahindra Sanyo Special Steel undertook the pilot case study by using the matrix developed as a part of the social roundtable. Here 10 companies from various industries have come together under the guidance from PRe to devise and validate the methodology to conduct S-LCA

The product considered is a tapered roller bearing produced by Mahindra Sanyo and then used in BMW 1 series.

Objective:

The goal of the pilot was to verify the social impact for a product that has its life cycle distributed across geographical borders and in different countries. In this pilot the steel rings for the bearings are produced in India after which they are warehoused in Hungary. The bearings are manufactured in Hungary and finally assembled in BMW cars produced in Germany.

The social impacts of the product were assessed from cradle to gate, right from extraction of the raw materials for steel manufacturing, and throughout the manufacturing phase of the bearing rings, delivery and the assembly phases of the tapered rolling bearings and car assembly.

Methodology:

In this pilot the scale-based and the quantitative approaches have been tested to prove their feasibility and of the relative indicators. As the product life cycle covers an emerging country India, it was meaningful to test all the indicators and their feasibility, by considering the different local contexts. India is considered a country with perceived high social hotspots, but these risks can be seen as an opportunity for all the companies that have a good level of commitment towards their social responsibility.

Big data meets small data in that footprint lab in the sky

Wednesday, 15th June - 08:45 - OS-5A.02 - Supporting supply chain due diligence on human and labor rights with Social LCA 3 - Knaffel gym - Abstract ID: 63 - Oral

Dr. Joy Murray¹, Dr. Arne Geschke², Dr. Arunima Malik³, Prof. Manfred Lenzen²

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When he asked the question “Does the Flap of a Butterfly’s Wings in Brazil Set Off a Tornado in Texas?” Edward Lorenz reminded us that everything is connected and that we are all part of the web that makes up life on this planet. His question suggested that we must pay attention to small data as well as to big - the micro and the macro. Lorenz’s work depended on computer modeling of atmospheric dynamics backed by observation. Writing in 1972 he concluded that with the ever-increasing power of computers and improvement of knowledge, one day his question would be answered.

Our work on bringing together big picture economic and social data and small-scale observations has also depended on increased computer power and advancements in knowledge. However with today’s speed of change we have not had to wait so long. When we first began our work at the University of Sydney around the year 2000 we could build models of a single nation’s economy and examine, at a macro level, a limited number of social and environmental effects of doing business. By 2013, pushing at the edge of computing capacity and stretching the research agenda, we built a model of the world’s economy and examined, albeit still at a macro level, a much wider range of social and environmental indicators. For example we quantified the effects of global trade on issues such as poverty, inequality, well-being or worker safety.

Meanwhile qualitative social researchers pursued micro level research documenting, for example, the practices of local organizations or addressing difficult social issues. The quantitative and the qualitative shared little common ground; big data and small data, the macro and the micro seemed destined to continue in their separate spheres of existence.

However 2015 saw exponential growth in computing capacity. And thanks to a small community of researchers across the globe, the know-how to include in a big data model of the world economy the particulars of social and environmental on-the-ground research became possible. This meant that for the first time big and small data could be handled within the same framework.

This paper discusses the bringing together of qualitative social research and quantitative input-output analysis. It illustrates the need to work together to realise the power of combining big and small data within a single framework that enables trade offs to be examined and well-being to become a recognised part of progress.

Interrelations between Poverty and International Trade

Wednesday, 15th June - 08:45 - OS-5A.03 - Supporting supply chain due diligence on human and labor rights with Social LCA 3 - Knaffel gym - Abstract ID: 10 - Oral

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Poverty is a chronic phenomenon that affects a large proportion of the global population; addressing it is a huge task. Using input-output analysis, we calculate the poverty footprint (PF) of nations associated with their imports. The PF includes all workers working in global supply chains who are living below the international poverty line (i.e. workers working in export-oriented products who earned less than \$1.25 a day; the poverty line reflects the minimum income or consumption required to meet basic human needs). Our results reveal the extent of the PF associated with exported products worldwide. Japan, the US and the European Union have the highest PF. About 70 % of total PF cases arise from the agriculture sector.

We use input-output tables that track all domestic and international monetary transactions. In addition, we include two physical accounts that trace the number of full-time equivalent workers and the income and salary paid to those workers per sector per country.

The results are important for organisations such as the World Bank as it develops strategies to decrease poverty by 2030, Sustainable Development Goals SDGs where ending poverty by 2030 is the first goal, and for Oxfam's work to live in a world without poverty.

Social Life Cycle Assessment in Biobased Industries: Identifying Main Indicators and Impacts

Wednesday, 15th June - 10:15 - OS-6A.02 - Identifying social impacts in a circular economy -
Knaffel gym - Abstract ID: 64 - Oral

Mrs. Parisa Rafiaani¹, Prof. Steven Van Passel², Prof. Philippe Lebailly³, Dr. Tom Kuppens⁴, Dr. Hossein Azadi⁵

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Assessing social impacts of various products, services and human activities has achieved an increasing interest worldwide. The nature of sustainability of biobased industries from a social point of view is how and to what extent they are perceived by society, and how various societies take advantages from such activities. However, an important issue is that social factors are not usually easy to be quantitatively analyzed and although the social impacts might be very remarkable, especially at the local scale, they have been not possible to be investigated in the majority of impact evaluations in the past. Despite the existence of many different methodologies towards Social Life Cycle Assessment (SLCA) to address social impacts of various businesses and industries, most of them impartially address social performances of an industry. The aim of this paper is to highlight the main criteria that need to be taken into account in SLCA approaches for identifying the social indicators and impacts of biobased industries that is a timely topic worldwide toward climate change mitigation goals. Accordingly, considering the general approach of SLCA and particularly its inventory analysis phase for impact categories and indicator determinations, the paper provides an overview of the existing guidelines and frameworks for identifying social indicators and impact categories associated with bio-industries. In conclusion, main impact categories and indicators formulated in the existing frameworks applied to biobased industries are demonstrated as a basic set of applicable elements of social dimensions in evaluating bio-industries' sustainability when conducting SLCA. The state of the art for this study mainly includes leading journal articles, international reports and conference papers up to and including 2016 on SLCA in biobased industries. According to the reviewed frameworks in this study, quantitative, midpoint and site-specific data are the main elements taken into account when collecting the data for biobased product social impact assessment. This study also reveals that although SLCA is in its early steps of development and despite in numerous cases, conducting a comprehensive SLCA is not yet feasible, it has been considered to have substantially promising methodological attributes that can help policymakers and other stakeholders to quantify and assess sustainability of bio-industries from the social perspective. Recommendations for further research work concerning SLCA in bio-industries are also presented.

Social implications of a circular economy

Wednesday, 15th June - 10:15 - OS-6A.03 - Identifying social impacts in a circular economy -
Knaffel gym - Abstract ID: 39 - Oral

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1. Context

There is a need to work towards a circular economy within a context of sustainable development where, inter alia, innovative product-service combinations contribute to the future of societies. Based on (international) scientific reports the conclusion is that the time horizon for the realization of such an economy is 2020-2030.

2. Objective

Today, most of the efforts for shaping a circular economy take into account environmental and economic considerations. The social implications are (almost) not on the radar of the research agenda.

3. Methodological research questions

In order to illustrate the type of questions, some of these questions are formulated. Note that a distinction is made between the macro, meso and micro level.

-> at the level of a country (macro level):

- how to encourage the shift towards a circular economy (including the use of product-service combinations.) with a - possibly renewed - social security system?
- how employment (with corresponding income) is guaranteed for unskilled workers?
- how to avoid increasing inequality in and between countries?
- how solidarity with the Global South can continue when the import of raw materials and the export of waste are decreasing?

-> at the level of the sectors (the meso level):

- how can barriers between sectors and their organizations - both employers and employees - be removed?
- how are education and lifelong learning reformed in relation to the objective?

-> at the level of product-service combinations and sharing goods (the micro level):

- how is people can change their behavior in the short term from 'I' to 'we'?
- what about 'trade off' and 'rebound' effects?
- is there no need for the full deployment of the instrument of 'technological and scientific assessment' when developing product-service combinations?
- are the intended product-service combinations (easily) accessible to everyone?
- is there no danger in eliminating 'literacy' for using (certain) product-service combinations?

4. Contributions

During the oral presentation more detail will be given, highlighting the need for multi- and interdisciplinary research. One brief example for now. At present, ten drills are sold for ten households. After some time these are broken and cannot be repaired any more: you need to buy a new drill. In some countries social security is financed (for $2/3$) by taxes on labour required to make these drills. What if in the future one drill through ten households is shared and can be repaired easily?

Circular economy: a critical review of concepts, and some thoughts on its usefulness in creating positive social impacts

Wednesday, 15th June - 10:15 - OS-6A.04 - Identifying social impacts in a circular economy - Knaffel gym - Abstract ID: 47 - Oral

Mrs. Luce Beaulieu, M.Sc.¹, Mrs. Gabrielle Van Durme, M.Sc.¹, Mrs. Marie-Luc Arpin, B.Eng., M.Sc., Ph.D. candidate¹, Dr. Jean-Pierre Revéret¹

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Circular economy (CE) is a new concept currently gaining traction in both policy and business. According to the Ellen MacArthur foundation, a circular economy aims at closing technical and biotic loops through a reconfiguration of economic and industrial relations, resulting in a restorative system that enables human beings to exist in adequacy with Earth's limited non renewable resources. Conceptually, CE stems from various scientific fields such as industrial ecology, functional economy, cradle to cradle, and more. It is also a concept that has commonalities with concepts, disciplines, approaches or practices such as sustainable development, green economy, life cycle thinking, ecological transition, extended producer responsibility, shared value and ecodesign.

It is in order to better understand CE, its various underpinnings and how it can relate to impact approaches such as LCA that CIRAIG, in association with several industrial partners of its International Life Cycle Chair (Polytechnique Montreal/ESG UQAM), published a white book on the subject in Fall of 2015. Through a critical literature review of concepts, CE is explored in order to understand its basic underlying assumptions. The scientific and grey literature of the aforementioned disciplines, approaches and practices are explored at a conceptual level, in order to paint an up-to-date portrait of CE as well as evoke its far-reaching history. Conceptual mappings are presented in order to better understand CE and its associated concepts' configuration and links.

Linking back to social impact, it is quite apparent that the social dimension of sustainability is practically absent within CE literature, except within a few organizations' definition (e.g.: ADEME's definition, which includes job creation and human well-being). There exist, however, some scientific subjects (namely: functional economy, cradle to cradle and the sharing economy), which could enable positive social impacts in a revisited CE. Based on this investigation, possible research agendas are proposed that could link back to Social LCA, social impact assessment, social foot or hand printing and social value literatures.

Social organizational LCA (SOLCA) as complementary approach for boosting social LCA

Wednesday, 15th June - 17:15 - KPA.01 - Keynote presentation abstracts - Abstract ID: 33 - Oral

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Current product related social life cycle assessment (SLCA) addresses social aspects from a life cycle perspective, but it is not yet broadly implemented in decision relevant practice. We propose a complementary, organizational perspective to boost SLCA—the social organizational LCA (SOLCA).

The paper addresses those challenges of SLCA which may be overcome by an organizational perspective. An analysis of the indicators proposed by SLCA revealed that existing SLCA case studies do not really evaluate the social performance of products. From the 189 indicators proposed in SLCA methodological sheets, only eight refer to the product level, while 127 and 69 refer to the organizational and country level (including overlaps). This is a clear indication, that an organizational approach to social LCA might be more straightforward than a product focussed approach.

First ideas for a conceptual framework for SOLCA are developed. The two underlying methodologies: the guidelines for SLCA of products and the guidance on organizational LCA (OLCA)—which adapts product LCA to the organizational perspective—were reviewed, compared and adapted to a social organizational perspective. Based on this, different implementation pathways were identified, showing how SOLCA could be applied in practice by considering different levels of organizations' experiences with social and environmental assessments. Three SOLCA implementation pathways are proposed. Existing experience of organizations in social organizational approaches—like Global Reporting Initiative (GRI) or product SLCA—and environmental approaches—like environmental management systems (EMS) or OLCA—can be used as starting points as they can provide useful information on the organization's structure, value chain, etc.

Methodologically, SOLCA may streamline allocation, data collection, and application in practice. The conceptual framework for SOLCA is focused on scope and inventory, which were found to differ most from SLCA and OLCA; all relevant steps like definition of unit of analysis or multi-functionality are addressed.

In conclusion, SOLCA helps to overcome some major challenges of SLCA and thus is a promising approach for putting it into practice. The frameworks of SLCA and OLCA can be integrated into SOLCA, and existing experience from organizations can be used for implementing it. However, new challenges arise. This includes potential difficulties for primary data collection in complex organizations with many different sites or the difficulty to distribute or aggregate social aspects within the organization. Further development and testing of SOLCA is therefore recommended—not as a substitute for SLCA, but as a complementary win-win approach.

SOCIAL LIFE CYCLE ASSESMENT METHODOLOGY FOR A COSMETIC PRODUCT

Wednesday, 15th June - 17:15 - KPA.02 - Keynote presentation abstracts - Abstract ID: 81 - Oral

Mr. Charles DUCLAUX¹

¹L'OREAL

Charles Duclaux (1), Sara Russo Garrido (2), Alessandra Zamagni (3), Elisabeth Ekener Petersen (4), Ania Dubois-Iorgulescu (5), Andreas Ciroth (6)

(1): L'Oréal

(2): CIRAIG

(3): ENEA

(4): Royal Institute of Technology

(5): UFRJ

(6): GreenDelta

Corporations and their stakeholders are increasingly interested in the social impacts within the product value chains. Consequently, the purpose of this work is to present an objective methodology, and to report the social impact of cosmetic products during their entire life cycle.

Methodologies for assessing potential impacts are available since ten years, but a number of these are not adapted to the cosmetic sector or are biased in their assessment of each social issues. This specific methodology development involved multiple internal and external stakeholders for L'Oréal, who have been selected to ensure a complementary and relevant panel to address the risks of the method to develop.

There are five main phases in the methodology:

- The definition of the system boundaries addressed by the methodology
- The selection of appropriate impact categories (“social issues”) and subcategories, and the essential specifications needed to evaluate them for the cosmetic industry
- Definition of grades in relation with the data availability
- Evaluation of a quantitative value

Four social topic categories were defined which gathered nineteen indicators associated to twelve impact subcategories: fair methods, fundamental human rights, health & safety, social improvement / community development. The results presented by different methods of aggregation (by stakeholder category; by main impact category; by life cycle stage) in order to use them for further decision analysis.

A complementary approach to address positive social potentials impact of products has been integrated into the methodology.

An analysis to measure the reliability of the method was completed two products:

- A BB Cream produced in France;
- A Shampoo produced in the US

The final report details the assessment limits and the main findings by using this methodology.

Keywords: Social impact assessment, cosmetic industry, social life cycle assessment, stakeholders, assessmentmethod, positive impact.

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