

Rainer Grießhammer, Catherine Benoît, Louise Camilla Dreyer, Anna Flysjö, Andreas Manhart, Bernard Mazijn, Andrée-Lise Méthot and Bo Weidema

Feasibility Study: Integration of social aspects into LCA

(May 2006)

1 Abstract

The feasibility study was prepared in a multi-stage discussion process within the context of the Task Force "Integration of social aspects into LCA" of the UNEP-SETAC Life Cycle Initiative. The methodology of environmental or biophysical LCA was taken and checked whether and how social aspects can be integrated or supplemented to conduct a Social LCA (SCLA). Furthermore core elements and requirements upon the integration of social aspects are formulated.

In terms of methodology, there are evidently no fundamental problems calling the feasibility of SLCA into question. There are however certainly considerable hurdles to be overcome in practice, especially in characterisation modelling, because social impacts will require an entirely different type of modelling. Hurdles arise in the goal and scope definition (for example system boundaries and allocation/cut off criteria), in the categorization of indicator groups, in the classification of the associated individual indicators and in their characterization. It is quite probable that the very different appraisals of social aspects by different actors and in different countries, in combination with the process of interdisciplinary scientific discourse, will delay agreement for a longer time.

To promote the development and practical use of Social LCA the next important steps are to conduct more case studies, to establish a generally accepted list of well defined social indicators, to establish databases and to collect module for the upstream chains and to compose an (extended) "code of practice" for Social LCA.

2 Status

The feasibility study was prepared in a multi-stage discussion process within the context of the Task Force "Integration of social aspects into LCA" of the UNEP-SETAC Life Cycle Initiative. The content and drafts of the study were discussed at the Task Force meetings in Bologna (January 2005), Lille (May 2005) and Brussels (November 2005). Main topics were

discussed in a formal procedure with a questionnaire and contributions of the members of the taskforce¹

3 Goal of the feasibility study

The aim of the feasibility study is to identify whether and in what manner social aspects can be integrated into environmental biophysical LCA² methodologies, and how the process towards agreement in the expert community (Code of Practice) and towards standardization over the long term could best be shaped. Furthermore, core elements of and core requirements upon the integration of social aspects shall be formulated.

In the sustainability debate in some countries, the terms “social” and “societal” are defined differently and indeterminately, without sharp boundaries. The following presentation uses “social” as a generic term³. The precise meaning needs to be clarified when selecting and defining social indicators.

4 Background

The feasibility study was prepared within the context of the Life Cycle Initiative (UNEP/SETAC), and thus relates essentially to Life Cycle Assessment within the environmental dimension and to the integration of full product systems. Both within the Life Cycle Initiative and beyond, there are moves towards the parallel or integrated analysis of both social and economic aspects (Life Cycle Costing) and towards sustainability analyses across entire product cycles (e.g. PROSA - Product Sustainability Analysis/Eco-Institute, SEE – Socio-Eco-Efficiency-Analysis/BASF, PSAT – Product Sustainability

¹ Benoit, C. ; Méthot, A.-L. ; Revéret, J.P. ; Hébert, Julie : General comments on social indicators. Document 2005; Benoit, C. ; Hébert, J. ; Méthot, A.-L. ; Revéret, J.P. ; Côté, V.: Revised List of Social indicators. Excel document 2005; Dreyer, L. C.: Comments on Bo Weidema's presentation. Document 2005; Flysjö, A: Comments on Bo Weidema's indicator classification. Email & spreadsheet; 2005 Griebshammer, R.: Questionnaire on social indicators / damage categories. Document 2005; Griebshammer, R.: List of social indicators. Spreadsheet 2005; Marshall, K.: Fundamental comments on Bo Weidemas proposal. Document 2005; Mazeau, P.: Comments on Bo Weidema's indicator classification. Email 2005; Mazijn B., Doom R., Peeters H., Spillemaeckers S., Vanhoutte G., Taverniers L., Lavrysen L., Van Braeckel D., Duque Rivera J. (2004), "Ecological, social and economical aspects of integrated product policy - Integrated Product Assessment and the development of the label 'sustainable development'. Final Report, UGhent-CDO/Ethibel, Belgian Science Policy, Project CP/20, 124 pp. plus annexes; Méthot, A.-L.; Revéret, J.P.; Benoit, C; Hébert, J.; Plouffe, S.: Comments about the proposal for a consistent structure for modelling the social impact chains inventory results to damage categories. Document 2005; Méthot, A.-L.; Hébert, J.; ACVS-FIDD First Results. PPT Document 2005; Méthot, A.-L. Todd, Susan ; Hébert, J. ; ACVS-FIDD Results, Comparisons GRI and ACVS-FIDD. PPT Document 2005; Méthot, A.L., Revéret, J.P.; Hébert, J., Benoit, C.: Comparisons of the ACVS-FIDD and the Integrated Product Assessment Tool by Integrating Social Aspects in a LCA Setting. PPT Document 2005; Pelupessy, W.: Socioeconomic criteria in LCA. Email 2005; Ugaya C.: Comments on the list of social indicators. Email & Spreadsheet 2005; Weidema, B.: A consistent structure for modelling the social impact chains from inventory results to damage categories. Presentation & Document 2005

² In the following we take the names environmental LCA (or just LCA) and Social LCA (or SLCA)

³ It is worth noting that generic terms are also used in the other dimensions. For instance, the economic dimension covers both micro-economic and macro-economic aspects.

Assessment/Procter&Gamble, Sustainability Compass/German Telecom etc.⁴). A synopsis of proposed approaches and case studies on sustainability assessment of products showed a broad range of names, definitions and methodologies⁵. Furthermore, there is an intense debate on the integration of social aspects in reporting and in the rating of companies (sustainability rating, GRI – Global Reporting Initiative, Global Compact, planned ISO standard on CSR etc. While the performance of an environmental LCA has been set out in detail by ISO standard 14040 ff., for Social Assessment and other similar approaches there is no comparable standard or internationally recognized code of practice. It is a open question whether the environmental LCA and ISO 14044 apply to Social LCA (as Bo Weidema states⁶, ⁷ or not. There are also many contributions from "outside of the LCA-world".

Compared to environmental and economic aspects, social aspects present special problems⁸ because they can be highly diverse and are weighted very differently by different interest groups and in different countries and regions. A further point is that evaluations of these aspects are subject to swifter change over time than those of environmental aspects. The experience gained in the development of LCA methodology indicates that a coordinated development of a Social Life Cycle Assessment (SLCA) methodology suitable for treating social aspects will need about five to ten years.

Past experience in product sustainability assessment shows that major product-related social aspects are largely of three types:

- Particularly severe positive or negative effects (hotspots) at the level of resource extraction, upstream chains, production or trade that can be attributed directly to the product: Examples are destruction of systems that support human livelihoods, child labour, wages below subsistence level, etc.
- Utility aspects and impacts upon consumers.
- Indirect effects of product use upon society, such as changes in society caused by cars or mobile phones (comparable to the discussion on rebound effects in environmental LCA).

⁴ Rainer Griebshammer, Matthias Buchert, Carl-Otto Gensch, Christian Hochfeld und Ina Rüdener, "PROSA – Klartext zur sozialen und gesellschaftlichen Dimension von Produkten", UmweltWirtschaftsForum, 12.Jg, H 1, März 2004; www.prosa.org; Marina Franke, Procter&Gamble, " PSAT - Product Sustainability Assessment Tool: A Method under Development; Congress "PROSA - Product Sustainability Assessment, Challenges, case studies, methodologies", Lausanne July 2005; Andreas Kicherer, BASF, "SEEBalance - The Socio-Eco-Efficiency Analysis", Congress "PROSA - Product Sustainability Assessment, Challenges, case studies, methodologies", Lausanne July 2005 ; Tim Otto, Deutsche Telekom, "Sustainability Compass (SC). Assessment of the contribution made by ICT services to sustainability", Congress "PROSA - Product Sustainability Assessment, Challenges, case studies, methodologies", Lausanne July 2005

⁵ Ina Ruedenauer und Frank Ebinger, "Synopsis und Auswertung von Methoden für PROSA", Working paper, November 2002

⁶ Bo Weidema, Letters to the Editor: ISO 14044 also Applies to Social LCA, Int J LCA **10** (6) 381 (2005)

⁷ Dreyer LC, Hauschild MZ (2006): Scoping must be done in accordance with the goal definition, also in Social LCA. Int J LCA **11** (2) 87..

⁸ Flysjö stresses the problems of social aspects: "Nor are they (at least to a quite large extent) quantifiable, why a lot of the "simplicity" of normal LCA is lost. This makes it also difficult to relate to a functional unit" (comment Anna Flysjö, april 16, 2006)

Nonetheless, other incidences can be found even if they are not as obvious as human rights infringement. However, in a perspective of continuous improvement of the corporation activities and policies, they are as relevant to study. The overall conditions of production throughout the chain must be object of assessment including those aspects that represent added-value such as holiday and paternity leaves.

Many impacts can be assigned to different dimensions, as current indicator list practice shows. This is exemplified by health-relevant indicators (sometimes assigned to the environmental dimension, sometimes to the social dimension) or indicators relating to the workplace and regional economy such as the number of jobs, the strengthening of the regional economy etc. (sometimes assigned to the economic, sometimes to the social dimension). This should be object of a decision at the step of defining the indicators.

5 LCA-Methodology as background

The aim of the taskforce was to check whether and how social aspects can be integrated into LCA. Nevertheless there was a debate in the taskforce about this preliminary decision. It was concluded, that there are some methodologies to integrate social aspects. But the LCA-methodology seems particularly appropriate to analyse products and their life cycle and to bridge the gap between scientific and practical requirements.

Accordingly the existing environmental LCA methodology and its theoretical foundations are revised and supplemented to include the analysis of social aspects, which would involve amongst other things an extension of the impact categories. Nevertheless there are however certainly considerable hurdles to be overcome in practice, especially in characterisation modelling, because social impacts will require an entirely different type of modelling.

Over the medium term, economic aspects could then also be included, thus gradually building a Sustainability LCA method. It is also possible – depending on the goal and scope of a casestudy – to concentrate solely on social aspects and perform a "pure" Social Life Cycle Assessment (SLCA).

Compared with the "traditional" environmental LCA the integration of social aspects demands to set more priority

- on the process and the integration of stakeholder positions and
- on the treatment of product utility and respectively on the functional equivalence.

5.1 Participation of stakeholders

As the social aspects can be highly diverse and are weighted very differently in different countries and regions and by different stakeholders⁹. It is "wise" to include stakeholder or at

⁹ Stakeholder are "those groups and individuals that can affect, or are affected by, the accomplishment of organizational purpose" by Freeman, R., (1984), Strategic management : a stakeholder approach, Boston, Pitman, p.25

least stakeholder positions¹⁰ (an obligation to integrate stakeholder formally would go to far¹¹).

The integration of stakeholders bases the indicators and judgements on a broader discussion and helps to collect data. Ugaya and Benoit¹² mentioned the need to take regional and national characteristics into account, which can hardly be covered by one static system. On a global scale one could avoid confronting the stakeholders with “western imposed social benchmarks” (Pelupessy¹³).

5.2 Product utility and functional equivalence.

In environmental LCA-case studies, it is assumed that product utility can be characterized relatively simply and that it is captured sufficiently by the concept of functional equivalence when carrying out comparisons between different products or alternatives, even though the methodological approach should be more ambitious¹⁴. The experience gained in many case studies has shown that when alternatives differ significantly (e.g. disposable beer bottle, reusable beer bottle, beer can, beer cask; mobility systems such as car, public transport and cycling; nappy systems such as disposable nappy, cloth nappy washed at home, cloth nappy washed by a washing service) functional equivalence can be elusive. Beside “technical” utility, a range of social aspects such as time requirement, convenience, prestige etc. are key aspects of product utility. Accordingly it is essential to describe the functional equivalence (technical utility) and the corresponding social and symbolic functions for the consumer.

Social impacts or benefits on the consumer should be described as part of the product utility. Social impacts on the society correspond with common or internationally accepted values and should be described as other social impacts along the life cycle¹⁵.

6 Social indicators – a new challenge

6.1 Midpoint versus endpoint indicators

The "traditional" LCA's use mainly inventory indicators and midpoint indicators, but also endpoint indicators. Dreyer and Flysjö¹⁶ stress that midpoint indicators should mainly be used, because they are closer to the activities and understanding of the decision making

¹⁰ "Because stakeholders must consent to this reciprocal relationship, they must have the right to exercise voice in the firm's governance process". BECKENSTEIN, A., (1996), Stakeholder Negotiations ; exercises in sustainable development, IRWIN, p. 2.

¹¹ Minutes of the Taskforce Meeting, Brussels, 11. and 11. November 2005; TOP 4, question 5

¹² Benoit, C.: General comments on social indicators. Document, 2005; Ugaya C.: Comments on the list of social indicators. Email & Spreadsheet, 2005

¹³ Pelupessy, W.: Socioeconomic criteria in LCA. Email, 2005

¹⁴ B P Weidema, H Wenzel, C Petersen, K Hansen (2004) "The product, functional unit and reference flows in LCA". København: Miljøstyrelsen; (Environmental News 70)

¹⁵ Minutes of the Taskforce Meeting, Brussels, 11. and 11. November 2005; TOP 4, question 1

¹⁶ Dreyer, L. C.: Comments on Bo Weidema's presentation. Document 2005; Flysjö, A: Comments on Bo Weidema's indicator classification. Email & spreadsheet 2005

companies. Pelupessy stated that the need to monitor dynamic changes of social impacts makes it complicated to connect with cause-effect chain¹⁷. The Taskforce recommends to combine inventory indicators, midpoint and endpoint indicators but – for practical reasons - to start mainly with inventory indicators and midpoint indicators. Endpoint indicators could be added later on.

In order to develop a social Life Cycle Assessment of products and services, the Taskforce stresses the need for well discussed indicators in order to lay the basis for measurements of positive and negative social impacts. Some participants are actively developing sets of indicators for this purpose. The Öko-Institute for example collected about 3.500 indicators covering all forms of social aspects, key documents like the OECD-Guidelines for Multinational Enterprises, the Global Reporting Initiative, the SA 8000 and the ILO-Conventions and many other proposals. But the use of those indicators is restricted by the fact, that many existing indicator-sets are not developed for applications in life cycle assessment, but rather to monitor social aspects of individual sectors, governments and countries.

Although there is wide agreement, that indicator-sets for the purpose of social LCA are needed, for time-reasons the Taskforce could not develop an universal indicator-set as a basis for all further LCA applications. Although such a universal set of indicators would still have to be improved after pilot applications, it would be a worthwhile contribution to the overall discussion of social aspects. The development of an standard set of social indicator needs further elaboration (see below).

6.2 Classification systems for social indicators

The Taskforce intensively discussed the topic of classification systems for social indicators. The group widely agreed upon the need of such a system. Currently there are two proposed classification systems, which are complementary and not contrary.

In his presentation on “a consistent structure for modelling the social impact chains from inventory results to damage categories”, Bo Weidema proposed to categorize the social indicators¹⁸ and offered a set of nine categories (see below). The taskforce debated the proposal in general and the categories in detail¹⁹. Most of the members of the Taskforce proposed an stakeholder approach. After an intensive discussion the Taskforce agreed with the following procedure²⁰: In the phase of scope and analysis one should choose an stakeholder approach and according to this classify the indicators (comparable to GRI). In the phase of evaluation one can also arrange the social indicators in impact categories. It has been proposed to replace impact categories by "protection areas", but this name could lead to misunderstanding as the environmental LCA defines protection areas differently. The

¹⁷ Pelupessy, W.: Socioeconomic criteria in LCA. Email 2005

¹⁸ Weidema, B.: A consistent structure for modelling the social impact chains from inventory results to damage categories. Presentation & Document 2005

¹⁹ Rainer Griesshammer, Andreas Manhart, Louise Dreyer and Anna Flysjö, "Developing a Set of Indicators for a Social LCA", November 2005

²⁰ Minutes of the Taskforce Meeting, Brussels, 11. and 11. November 2005; TOP 4, question 2

resulting list of indicators is classified in the first column after stakeholder groups, in the second column after impact areas. One impact category can be related to several stakeholder categories, one stakeholder category can be affected by different impact categories.

6.2.1 The stakeholder approach for indicator-classification

The purpose of the classification along stakeholder groups is to make sure that the Social LCA experts are matching the goal and scope and are assessing the bulk of the situation. For practical reasons and following the common practice the stakeholder categories were defined. Stakeholders will vary not only from one study to the other but also within each step of the value-chain. Efforts will have to be made while conducting a Social LCA to support stakeholders in finding and defining indicators adapted to their context and understanding. Looking at the complete life-cycle of a product, the Social LCA assesses social impacts of all its life-cycle steps from cradle to grave. These are related to resource extraction, processing, transport, manufacturing, assembly, marketing, sale, use, recycling, disposal and others as found during the construction of the process tree. Each of these steps can be associated with geographic locations, where one or more of these steps are carried out (mines, factories, roads, rails, harbours, shops, offices, recycling-firms, disposal-sites...). At each of these geographic locations we may observe social impacts on Workers/employees (accidents, remuneration, working-conditions...), on local communities (toxic pollutants, human rights abuses, improved infrastructure...), on the society (corruption, payment of taxes, digital divide, ...) and on consumers (during product use only) ²¹.

In the Taskforce other forms of stakeholder grouping and additional groups were discussed (for example Companies, NGOs, Government Politics, Future generations) and further differentiations or subgroups (for example Management, Shareholders, Suppliers, Business Partners). At last there was an agreement on four main stakeholder categories:

- Workforce (Workers/Employees),
- Local Community,
- Consumers (concerning only on the use stage);
- Society (national and/or global).

6.2.2 The indicator-classification with impact categories

The purpose of the classification with impact categories is to support the choice of stakeholders, to group impact indicators to the same impact and to support the interpretation.

Bo Weidema proposed to categorize the social indicators²² in damage categories and offered a set of nine categories²³. There was a long discussion on these and other possible

²¹ Rainer Griesshammer, Andreas Manhart, Louise Dreyer and Anna Flysjö, "Developing a Set of Indicators for a Social LCA", November 2005, p. 3f.

²² Weidema, B.: A consistent structure for modelling the social impact chains from inventory results to damage categories. Presentation & Document 2005

categories²⁴. At last the Taskforce stated that predominantly the impact categories should be chosen in accordance with internationally recognised categorisations/standards (like the UN-declaration on economic, social and cultural rights - ECOSOC, standards for multinationals) and/or in a multistakeholder process. The following thinkable categories were proposed: equal opportunities, workers rights and working conditions, respects of national and international laws, human rights, consumers protection.

Nevertheless the commitment to impact categories needs further elaboration. For example there could be an overlap between the categories, which may result in double counting in the LCA depending on the specific modelling. Equal opportunities may partly be covered by discrimination (part of workers rights) and workers rights are part of human rights.

6.3 Qualitative versus quantitative Indicators

There is a general discussion to use mostly quantitative inventory data for social LCA or to focus more on qualitative data and indicators²⁵. Quantitative data are those expressed in numbers and qualitative data are those expressed in words. The Taskforce took side for a combination of quantitative and qualitative data, indicators and analysis. It voiced the opinion, that quantitative data and indicators alone are insufficient to cover all aspects of social impacts. On the other hand, one has the possibility to "translate" qualitative results into (semi-)quantitative results as suggested by Benoit and Dreyer²⁶. The aim is to produce the most accurate and relevant assessment possible. But even in the phase of interpretation one can work with quantitative results in parallel with qualitative results.

6.4 The complexity behind social indicators and the need of clear definitions

Most indicator-lists mask the complexity of the individual topics. A good example is the topic *child labour*. One would think that it may be easy to define child labour with one threshold-age globally. But looking at only one of the relevant ILO-Conventions – the ILO Minimum Age Convention No. 138 – one finds a whole set of possible threshold-ages for different kinds of work and for different economic situations:

The general minimum age for admission to employment or work is 15 years (13 for light work) and the minimum age for hazardous work 18 years (16 under certain strict conditions). Additionally there is the possibility of initially setting the general minimum age at 14 (12 for light work) in regions where the economy and educational facilities are insufficiently

²³ (1) Life & longevity; (2) Health; (3) Autonomy; (4) Safety, security & tranquillity; (5) Equal opportunities; (6) Participation & influence; (7) Cultural heritage; (8) Human productivity; (9) Resources (natural and manmade capital)

²⁴ see in detail: Rainer Griesshammer, Andreas Manhart, Louise Dreyer and Anna Flysjö, "Developing a Set of Indicators for a Social LCA", November 2005, p. 2f.

²⁵ Examples of qualitative indicators are languages spoken in the company or corruption or transparency.

²⁶ see in detail: Rainer Griesshammer, Andreas Manhart, Louise Dreyer and Anna Flysjö, "Developing a Set of Indicators for a Social LCA", November 2005.

developed. Furthermore the ILO Worst Forms of Child Labour Convention No. 182 adds another threshold age of 18 years.

During the process of collecting and sorting social indicators, one meets the problem that indicators are often tailor-made for very specific purposes: Almost all indicators set their focus on evaluating the differences between products and enterprises in one specific economic, social and political environment. In some democratically structured and industrialized countries differences between products and companies may be measured with indicators like the length of the annually paid holiday or the possibility for alternative working models like telecommuting, job-sharing etc. Other indicators focus on social aspects that central european workers take for granted since many decades. This includes indicators on child labour, human rights abuses, or the right for workers to enjoy at least one 24-hours rest every working week. It is still a challenge to come up with one integral set of indicators that covers the social aspects in all social, economic and political environments. The proposal of Dreyer et al.²⁷ to differentiate between obligatory indicators²⁸ and optional indicators address this problem.

This problem is further enhanced by many indicators that change their meaning while applied under different social, economic and political conditions. One example is the indicator *absentee rates from work*, which is sometimes used to measure the employees' health. Although the indicator might be a good tool to measure the working conditions in some welfare states, it may as well loose this connection when applied to a highly competitive labour market, where ill people may rather go to work than be fired on the spot.

Therefore, every indicator needs to be clearly defined in its context and needs to be discussed in a separate chapter. The definition of indicators should include realistic proposals for measurements and verification, possible modelling and assessment. So every indicator quoted is only a heading for a whole chapter discussing international agreements, case-studies and papers.

7 Methodology (key elements)

In the following the typical procedure used for an environmental LCA is transferred to S-LCA.

7.1 Basic methodological structure

Social Life Cycle Assessment (SLCA) explores social aspects throughout the product life cycle, generally with the aim of improvement or in comparison to an alternative. The methodology corresponds to that used in LCA (in which biophysical environmental aspects are studied throughout the product life cycle).

²⁷ Louise Camilla Dreyer, Michael Z. Hauschild and Jens Schierbeck, "A Framework for Social Life Cycle Impact Assessment", Int J LCA 2005 (OnlineFirst): 1-10

²⁸ In the technical language of CSR and audits often called "No, No's"

SLCA is carried out in four steps in a processual manner:

- Goal and scope definition,
- Inventory analysis,
- Impact assessment,
- Interpretation.

7.2 Goal and scope definition

7.2.1 General determinations

The client must determine who is to carry out the SLCA and who is to take and be responsible for the normative decisions. Both can be done by one person or institution, but it is also possible for two organizations to do this work in consultation (institute or consultant carrying out the analysis; company or other actors performing the impact assessment and/or weighting). For the evaluation, various actors come into question besides the client: a group within the company, the overall company, the company in cooperation with a supplier or client, a ministry, an international fund, an NGO, a dialogue forum involving the relevant actors, etc. It can be assumed that the scope and the interpretation will differ if they are carried out separately by different actor groups. It is wise to let stakeholders participate but there is no obligation to do so (see chapter 4.1), if the study is not published.

The scoping must determine the following points:

- Goal of the study (examples: product refinement, new product development, appraisal of public grant support),
- Inventory scope and system boundaries (examples: determination of which countries or regions are covered, evaluation of an existing situation or of a prospective development),
- Temporal scope,
- Functional unit and characterization of utility (in contrast to an LCA, utility aspects should be characterized in depth; see chapter 4.2),
- Alternatives / scenarios assumed including benchmarks and improvement options,
- Data quality requirements,
- Allocation procedure,
- Critical review (in the case of comparative evaluations and in the case of any publication).

7.2.2 Indicator selection

To carry out SLCA studies, it would be useful to have a universal set of indicator classified after stakeholder groups and impact categories (see chapter 6). Indicators can then be selected that are appropriate to the study's goal and to the capacity available.

7.3 Inventory analysis

7.3.1 Data collection and data availability

Different analysis steps must be performed depending upon the question pursued and indicator used. The time requirements of consumers can be surveyed empirically, the workplace conditions at a supplier company can be determined on-site and through questioning, etc.²⁹

At present, the problems arising in this analysis are usually as follows:

- Only a smaller part of the data sought is available in processed form from statistical or other sources.
- No input-output-data (module data) are yet available for several recurrent processes and activities (e.g. electronic component manufacturing, cotton production, railway use, web-based trading, etc.).
- Several dozen or even hundreds of upstream chains can be involved, particularly in the case of more complex industrial products.

General data availability will presumably only improve significantly when many case studies have been carried out and module data have been compiled for the upstream chains³⁰ and when a sufficiently large number of audits has been performed and published for companies that can be used for reference purposes.

Dreyer, Marshall and Méthot et al³¹ stressed the problem of data availability and reliability: This is especially the case for complex supply chains, where the individual companies have only limited overview of all involved enterprises. Weidema made the proposal to estimate the missing data based on averages. Only if a company can prove that its processes have smaller impacts it may apply such company-specific data instead of the default average³².

Also statistical data on the national and international level are not always reliable, since national authorities may for several reasons alter data on sensitive issues. Data on the international level are often based on such national statistics.

In regions with less developed administrations and in non-democratic states, data availability is likely to be severely restricted on all levels. Also appraisal methods for qualitative data may be severely limited under such circumstances. For these cases, Flysjö³³ suggests to concentrate on some representative key indicators.

²⁹ The situation is similar when performing an environmental LCA: A range of different analyses must be carried out to analyse noise, noxious substances, land consumption or carbon dioxide emissions.

³⁰ Such as: jobs per 1,000 tonnes of cotton, workplace accidents per 1,000 tonnes of cotton

³¹ Dreyer, L. C.: Comments on Bo Weidema's presentation. Document 2005; Marshall, K.: Fundamental comments on Bo Weidemas proposal. Document 2005; Mazeau, P.: Comments on Bo Weidema's indicator classification. Email 2005; Méthot, A.-L.; Reveret, J.R.; Benoit, C.; Hébert, J.; Plouffe, S.: Comments about the proposal for – a consistent structure for modelling the social impact chains inventory results to damage categories. Document 2005

³² Bo Weideman, Letters to the Editor: ISO 14044 also Applies to Social LCA, Int J LCA **10** (6) 381 (2005)

³³ Flysjö, A: Comments on Bo Weidema's indicator classification. Email & spreadsheet; 2005

7.4 Impact assessment

As in an environmental LCA study, the impact assessment should involve four steps: classification, characterization, normalization and analysis of data quality.

Here we discuss the classification, characterization and normalization steps in further detail.

7.4.1 Classification

This step assigns individual aspects to group indicators. In principle, this should already be done when defining an indicator (see above), which needs to be carried out with particular care for social aspects.

For example, different types of jobs could be associated with "employment". For classification (cf. ISO standard 14040 ff.) there is a need to determine whether full-time or part-time jobs are meant, or "minijobs", or jobs created under publicly-assisted schemes, self-employed jobs, well-paid, poorly paid, secure or insecure jobs, jobs within the country studied or abroad etc.³⁴

7.4.2 Characterization

The inventory outcomes (number of jobs, job satisfaction, digital divide, proportion with full-time nursery care etc.) cannot be simply added or aggregated. Here it needs first to be checked whether the outcomes have equal or dissimilar weights.

For example, there may be outcomes for full-time jobs (100%), part-time jobs (50%) and "side-line" jobs (defined by a maximal amount of money). One possible approach to deal with this could be to weight the jobs (for instance 1.0, 0.5 and 0.2) and then summate the weighted figures.

Furthermore, relevant methodologies need to be used for qualitative analysis.

7.4.3 Normalization (optional step)

Normalisation is an optional step and makes sense only with quantitative results. In the normalization step, the outcomes for the individual indicators are placed in relation to a suitable reference system such as product turnover, branch turnover, gross national product etc. The reference system used must correspond to that of the environmental LCA and the life-cycle costing, if the S-LCA is combined with life-cycle costing.

For example, a product might be cost-neutral, might lead to 40 jobs being lost in Germany, and might save 100,000 tonnes CO₂. In the normalization step, these impacts would be placed in relation to a comparable statistical universe, such as the overall unemployment figures of Germany and the overall CO₂ emissions of Germany. The effects could then be formulated as follows: The 40 lost jobs correspond to 1/100,000 of the overall German unemployment figure (= 40 out of 4 million), while the 100,000 tonnes CO₂ emissions correspond to 10/100,000 of the overall CO₂ emissions of Germany (=100,000 out of 1000

³⁴ Under ISO standard 14040 this corresponds to classification, i.e. this step determines which individual indicators belong to a group indicator.

million tonnes CO₂). This step represents no evaluation in itself, but the later evaluation is placed on a more rational basis, permitting more appropriate comparisons.

7.5 Interpretation of results, and evaluation

7.5.1 General checks

As in standardized LCA methodology, in the S-LCA the interpretation of findings should include checks of completeness (or full coverage across areas of impact), consistency and sensitivity. In addition materiality (or relevance of information provided), and responsiveness (or engagement of stakeholders) should be objects of checks. The actual evaluation of social aspects should be directed towards *formulating options for action*.

7.5.2 Evaluation process and weighting models

The evaluation of the Social Assessment is performed within a setting determined by actor-specific and individual interests and values, and is thus fundamentally subjective and non-objectifiable. For this reason alone there must be a plurality of evaluation and of weighting methods.

Evaluation can use a range of qualitative, semi-quantitative or fully quantitative methods – either standardized or developed specifically for a certain product.

Key requirements upon the evaluation process include the performance of a critical review, the participation of relevant actors, the documentation of the evaluation process (including disparate opinions), steps to ensure transparency and verifiability of results, and the use of analyses of significance and sensitivity. Conformity with the goal of the study and with the scope of the inventory analysis needs to be assured. If an aggregation is performed, then the detailed findings prior to aggregation need to be kept available in a suitable form.

8 Feasibility and further steps

In terms of methodology, there are evidently no fundamental problems calling the feasibility of SLCA into question. There are however certainly considerable hurdles to be overcome in practice. These arise in the categorization of indicator groups, in the classification of the associated individual indicators and in their characterization. It is quite probable that the very different appraisals of social aspects by different actors and in different countries, in combination with the process of interdisciplinary scientific discourse, will delay agreement for a longer time. For the further development process, there is an urgent need to carry out more case studies, improve the data situation, and create first module of datasets whether or not they are of input-output types.

To promote the development and practical use of Social LCA the next important steps are:

- to conduct casestudies with the key elements and the approach described above,
- to establish a generally accepted list of social indicators (inventory indicators, midpoint indicators, endpoint indicators), structured after stakeholder groups and after generally

accepted impact categories. The connection with indicators in the field of CSR (GRI, SA 8000, ILO, OECD Guidelines for Multinational Enterprises etc.) should be emphasised.

- to define and characterize the single indicators and typical measurement units,
- to check and improve existing databases and to collect module for the upstream chains³⁵,
- to agree on a way of providing data information and on an exchange format (such as ISO 14048)
- to use the described methodological key elements and approach and to compose a "Code of practice" for integrating social aspects into LCA or to extend the existing "Code of practice" for environmental LCA.

³⁵ Such as: jobs per 1,000 tonnes of cotton, workplace accidents per 1,000 tonnes of cotton