Commentaries

Describing Values in Relation to Choices in LCA

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Abstract

Intention, Goal, Scope, Background. It has gained growing acceptance in recent years that there are values in LCA, and several authors have discussed how value orientations can influence LCA models and results. The aim of this article is to continue this discussion and to focus on value choices in LCA.

Objectives. To find a way of describing value orientations in relation to choices in LCA.

Methods. This objective has been pursued in this paper by investigating the relationship between values and traditional science, exploring the concept of values, investigating the relationship between values and choice, and suggesting a way to describe the value base for specific choices in LCA.

Results and Discussion. Research on how to improve the environmental performance of products resembles peace research in that it aims to achieve a certain value-laden situation in society. The epistemological basis for peace research also seems to apply to LCA research. There are several classification methods for values and I claim that one is more suitable for choices in LCA than the others. The correlation between values and choice is not straightforward, and values can only partially explain choices.

Conclusions. Describing the value base for choices in LCA increases the consistency and transparency of the value choices and offers a means of justifying them.

Recommendations and Outlook. It is recommended that the value base is described in terms of 1) what is included in the concern for the environment 2) how tradeoffs are made and 3) how uncertainty is handled.

Keywords: Documentation format; ethics; life cycle impact assessment (LCIA); theory of science; valuation; values; weighting

Introduction

LCA has been developed with an ambition of describing environmental impacts of products and product systems. In the early days, LCA was mainly about mass and energy balances (Hunt et al. 1996). After some time, it was discovered that different LCAs of the same product system gave different results. LCA experts and users began to argue about right and wrong, and demands for 'scientific LCAs' were heard. Parallel to this, LCA began to be used as a tool for product development. Designers, who have many requirements to consider, saw the environmental aspect as one of many others and wanted a measure of all the added impacts. This led to the development of methods for weighting and aggregating different impacts to one number. The introduction of weights and values into LCA was objectionable to many (e.g. Schmidt et al. 2002). Voices demanding science-based LCA claimed that weighting should not be done, as it introduced subjective elements and decreased inter-study comparability. The conflict between these two viewpoints was made very clear during the consensus-oriented work in ISO, when the standards ISO 14040–43 were being written. The famous sentence in ISO 14042: "Weighting shall not be used for comparative assertions disclosed to the public" is proof of this, and proof that the conflict has not really been resolved.

The ISO standards for LCA contain several formulations indicating that the general view of the role of science in LCA is seen very simplistically. The term 'scientific' is used more or less synonymously with 'correct'. The impact assessment, and in particular weighting, is considered to be 'subjective', and the standard says: "subjectivity should be minimised". The ISO standard requires identification and reporting of all so-called 'value-choices'. There is also a special term 'technical assumptions' for some choices presumably thought of as not value laden. Hertwich et al. (2000) delivered a sharp criticism of how value issues are approached in the ISO standards.

Since 1995, several authors have addressed the issue of values in LCA. Volkwein et al. (1996b) address ethics and LCA, and suggest the use of human rights and international law and conventions as a base for valuation (Volkwein et al. 1996b). Finnveden (1997) looks at some weighting methods and asks, "Where are the values?". He discusses how different views of society, ethics and nature lead to different choices of weighting methods. Bengtsson (2000) notes that the fact that different weighting methods do not always agree is not a shortcoming attributable to subjectivity, but reflects real diversity in ways of looking at impacts. Many authors point out that value issues also influence choices made in the LCI phase (Hertwich et al. 2000, Werner et al. 2002). In the SETAC working group on impact assessments, there is a consensus that value issues play an important role in LCA (Finnveden et al. 2002).

Beltrani (1997) discusses safeguard subjects as moral objects and how these vary with different views of the environment such as anthropocentrism, pathocentrism (the be-
lieh that moral subjects are qualified through their capacity of having sensations and experiencing pain), biocentrism and holism.

One well-known example of value characterisation is the introduction of cultural science (Hofstetter et al. 2000). Human beings are classified according to their worldviews, attitudes, and management styles as hierarchists, egalitarians, individualists and fatalists. As the authors point out there is a weakness in the theoretical base, but it has great strength in communication. It is easy to say: "From an egalitarian point of view, A is better than B". This is also in agreement with a common need in product development: to identify different customer groups and describe them in different ways.

Another culturally oriented starting point for value systematics is described by Galtung (1996a) as 'deep culture'. Deep culture is defined as "collectively held subconscious ideas about what constitutes normal and natural reality". It plays an important role when there is uncertainty and stress, as in conflict situations. He identifies six deep cultures with respect to their views on nature, self, society, world, time, transperson and episteme:

- Occident I, centrifugal, in expansion (Greco-Roman, Modern)
- Occident II, centripetal, in contraction (Medieval)
- Indic (Hindu)
- Buddhic (Buddhist)
- Sinic (Chinese)
- Nipponic (Japanese)

From this brief review of the literature on values within and outside the LCA community, it seems reasonable to justify our value choices in an LCA by describing their value bases, so that it can be used in practice in a way that satisfies scientific standards. The aim of this article is to find such a method for describing the value base in LCA. This will be done by:

- investigating the relationship between value issues and traditional empirical science in LCA,
- exploring the value concept,
- investigating the relation between values and choice,
- seeking a way to describe the value base for specific choices in LCA.

1 Values and Science in LCA

Traditional science is about theories and experiments. Sometimes theories are created to explain experimental results. Sometimes experiments are used to test theories. Any law or theory has to be accompanied by instructions for when it is valid. One common idea is that theories should be falsifiable. But falsifiability is not a complete description of science. Not all statements, for example Darwinian theory, are falsifiable (Boulter 1999). In LCA, there are also several impact models that predict changes that will occur some time in the far future and that we cannot test. These theories can still be acceptable if they are in agreement with other linked theories, in spite of the fact that they are not falsifiable.

Hertwich et al. (2000) discuss the theoretical foundations for LCA, in particular with respect to the role of values, and in the context of decision making. By making an analysis of the GWP-indicator they demonstrate that "any impact assessment method inevitably contains not only constitutive and contextual values, but also preference values". They suggest that "the ultimate criterion for method choice is whether a given method is better than its alternatives in improving the decision".

An LCA is carried out because we want to achieve something that is value laden, i.e. to improve the environment. In that sense LCA research resembles peace research. Galtung (1996b) developed an 'epistemological basis' for peace research. In addition to data and theories, values play an important role. Galtung uses a triangle to illustrate his concept (Fig. 1).

Data divides the world into the observed and the unobserved. An LCI is mainly a compilation of data. Many of the models used in LCIA are dependent on environmental data and data about human behaviour.

Theories divide the world into the foreseen and the unforeseen. Emission models relating emission data to production data and characterisation models relating category indicators to emissions are examples of theories.

Values divide the world into the acceptable and the unacceptable. Weighting factors are not values in this sense. They are data used in theories, e.g. relating data on revealed preferences to category indicators. The types of values mentioned in Fig. 1 are deep underlying ideas representing ideals. They may be identified using psychometric tests, where choice plays an important role (Shields et al. 2002).

The science of linking data to theories is empiricism. It is at the core of natural science. When it is successful, all observed data are foreseen by theories, while unobserved data are unforeseen. Impact models and emission models in LCA are based on empiricism.

The science in which data is linked to values is criticism and is a core element of social science. Is what we observe acceptable or unacceptable? In LCA the choice of impact categories and elementary flow types are based on criticism. We would typically not include those parameters if they did not say something about an unacceptable impact on the environment.

Fig. 1: Data-theory-values triangle (Galtung 1996b)