

Choice of Valuation Methods in LCA: End Users' Perspective

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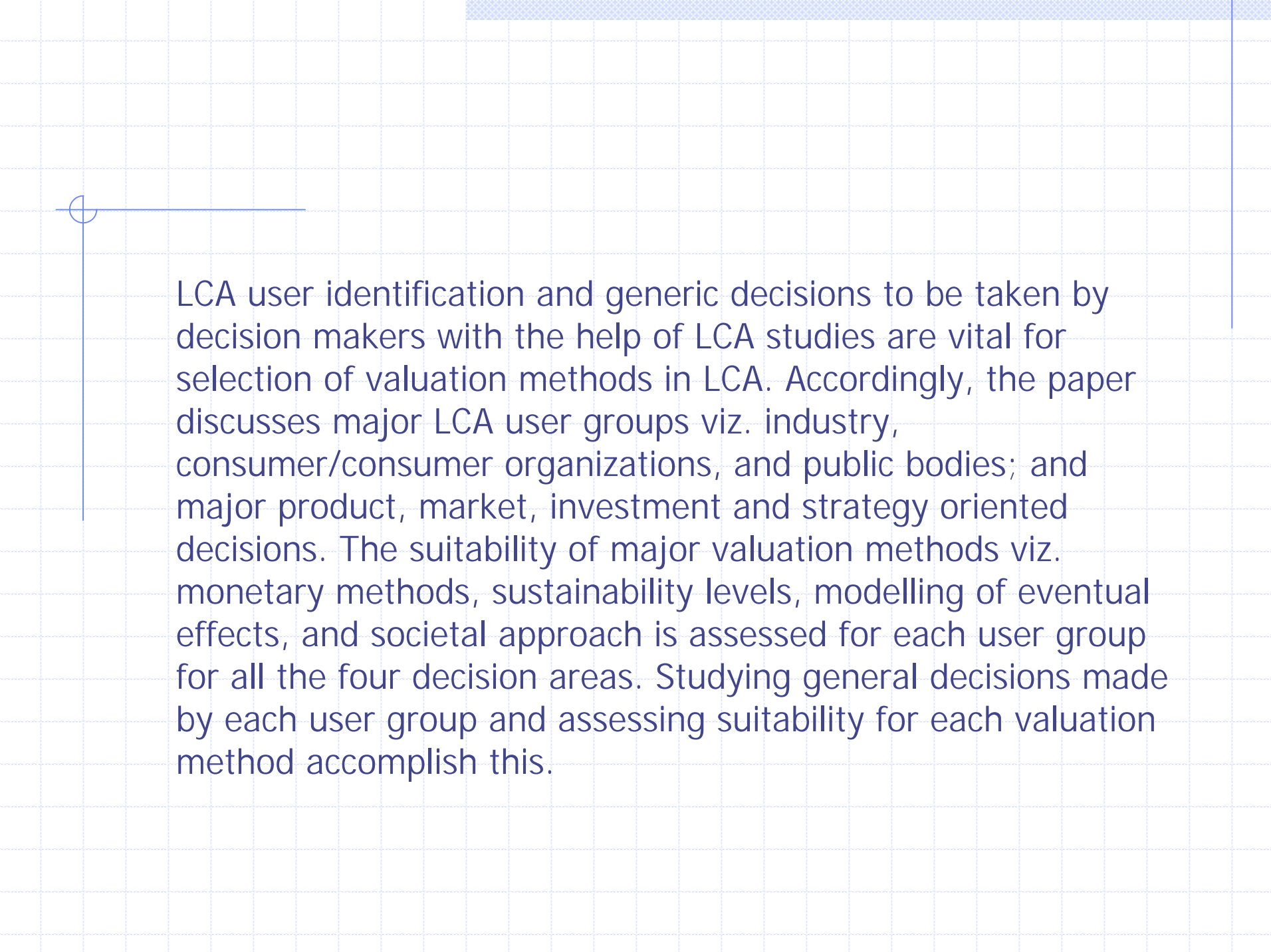
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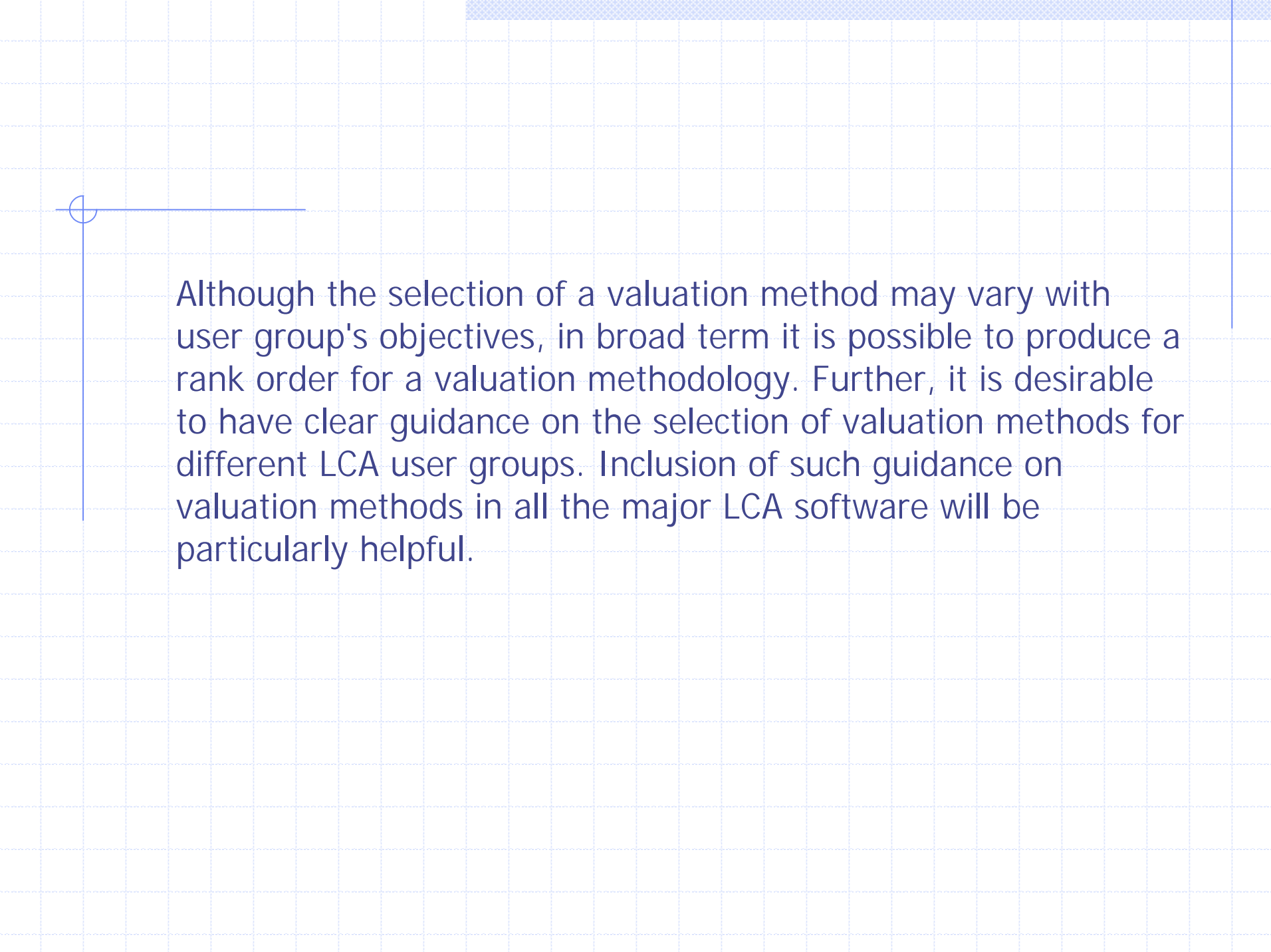
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Background

Life cycle assessment helps to take decisions and does not decide for decision makers. However, these decisions largely depend upon how well one can associate life cycle inventory results into environmental impacts and the valuation of environmental impacts. In any decision making process, unless the outcome is obvious, weights needs to be attributed to the impacts according to their relative importance. This is a highly subjective and controversial process. There is variety of valuation methods present in the literature; each has its own strengths and weaknesses. However, the suitability of these methods in different decision making situations is little reported. A little literature is available about the applicability of some valuation methods in the context of nations. But, no specific guidelines are available as to which valuation method is suitable for a particular type of decision. The paper attempts to suggest use of valuation methods based on their suitability for decisions to be taken by different users.



LCA user identification and generic decisions to be taken by decision makers with the help of LCA studies are vital for selection of valuation methods in LCA. Accordingly, the paper discusses major LCA user groups viz. industry, consumer/consumer organizations, and public bodies; and major product, market, investment and strategy oriented decisions. The suitability of major valuation methods viz. monetary methods, sustainability levels, modelling of eventual effects, and societal approach is assessed for each user group for all the four decision areas. Studying general decisions made by each user group and assessing suitability for each valuation method accomplish this.



Although the selection of a valuation method may vary with user group's objectives, in broad term it is possible to produce a rank order for a valuation methodology. Further, it is desirable to have clear guidance on the selection of valuation methods for different LCA user groups. Inclusion of such guidance on valuation methods in all the major LCA software will be particularly helpful.

Valuation Methods: At a Glance

◆ Monetary Methods

- Evaluates environmental issues in monetary terms

◆ Sustainability Levels

- Evaluates environmental issues in terms of sustainability

◆ Modeling of Eventual Effects

- Evaluates environmental issues in terms of its impacts

◆ Societal Approach

- Evaluates environmental issues in terms of preferences of stakeholders

What is LCA ?

- ◆ LCA is a tool for evaluating the effects that a product has on the environment over the entire period of its life—from the extraction of the raw materials from which it is made, through the manufacturing, packaging, and marketing processes, and the use, reuse and maintenance of the product, and on to its eventual recycling or disposal as waste at the end of its useful life.

Who uses LCA ?

- ◆ Industry
- ◆ Consumers / Consumer organization
- ◆ Government and
- ◆ Public bodies

Decisions taken on the basis of LCA by the user groups

- ◆ Product oriented decisions
- ◆ Market oriented
- ◆ Investment oriented and
- ◆ Strategic oriented

Decisions by industry

◆ Product oriented decisions

- Incremental improvement in existing product system
- Complete product redesign
- Alternative functionality
- Design for sustainability society

Decisions by industry

◆ Market oriented decisions

- Selection of suppliers
- Marketing decisions
- Communication with customers and other stakeholders
- Education

Decisions by industry

- ◆ Investment oriented decisions
 - Investment in new technologies or production lines
 - Permit decisions
 - Sector covenants

Decisions by industry

◆ Strategic oriented decisions

- New technology development
- Research and development for new product lines
- Environmental management and eco-auditing
- Benchmarking.

Industry: Conclusion

- ◆ Results show that core LCA application appear to be in the area of product and market oriented decision. Problems related to these types of applications include: how to link with non environmental aspects in design; and how to deal with transition problem – such as what to do with parts of old process that become obsolete.
- ◆ Investment and strategic decisions may use LCA and other tools, though their application may face complications owing to the uncertainty related to the outcome of research. In these cases, LCAs or LCA thinking may be appropriate.

Decisions by government

◆ Product oriented decisions

- Product policy
- Product requirements

Decisions by government

◆ Market oriented decisions

- Providing product information
- Green procurement
- General communication

Decisions by government

◆ Investment oriented decisions

- Designing cost effective emission reduction programs.

Government: Conclusions

- ◆ Result shows that the core application of LCA in public domain is related to product policy, setting eco-labeling criteria, strategic planning of waste management, and eco taxes.
- ◆ The use of LCA for publicly supported research and development programmes face the same problems as research and development in industry. In all these cases, tentative qualitative LCAs, and simplified technology scenarios for more quantitative assessments, in essence LCA thinking, seem to be the most appropriate for supporting decision making. However, many experts feel that for government a qualitative LCA may not be enough to set environmental policy.

Decisions by consumers / consumer organization

- ◆ Product oriented decisions
 - Purchasing decisions
- ◆ Market oriented decisions
 - Choosing a product or service supplier
- ◆ Invest oriented decisions
 - Investments in durable goods
- ◆ Strategic oriented decisions
 - Choice of consumption pattern

Consumers / consumer organization: Conclusions

- ◆ LCA may indirectly, through eco-labeling and comparative publications by consumer organizations, help consumers make decisions about products and investments.

Evaluation of valuation approaches for each user group and its decision

LCA user identification and generic decisions to be taken by decision makers with the help of LCA studies are vital for selection of valuation methods in LCA. Accordingly, the previous slides paper discusses major LCA user groups viz. industry, consumer/consumer organizations, and public bodies; and major product, market, investment and strategy oriented decisions. The suitability of major valuation methods viz. monetary methods, sustainability levels, modelling of eventual effects, and societal approach is assessed for each user group for all the four decision areas. Studying general decisions made by each user group and assessing suitability for each valuation method accomplish this.

Decisions

Purpose of LCA

Industry Concern

Suitable Method

Product oriented

Incremental improvement in existing product system

Environmental improvement opportunities across the life cycle of product

Monetary methods

Complete product redesign

Minimum economic liability across life cycle of product

Monetary methods

Alternative Functionality

Enhancing environmental performance of product

Monetary methods/
Sustainability levels

Design for sustainable society

Economically and environmentally viability of product

Sustainability levels/
Modelling of eventual effects

Decisions

Market oriented

Purpose of LCA

Selection of Suppliers

Marketing Decisions

External Communication

Education

Industry Concern

Environmental liability of suppliers

Environmental performance across life cycle of product

Improved relationship with stakeholders and customers

Internal communication with employees

Suitable Method

Monetary methods

Sustainability levels/
Societal valuation

Societal valuation

Sustainability levels/
Modelling of eventual effects



Decisions

Investment oriented

Purpose of LCA

Investment in new technologies or product lines

Permit decisions

Industry Concern

Long term environmental performance

Minimum environmental liability across life cycle of product

Suitable Method

Monetary methods

Sustainability levels/
Modelling of eventual effects

Decisions

Strategic oriented

Purpose of LCA

New technology development

R&D for new product lines

Environmental management and eco auditing

Benchmarking

Industry Concern

Long term environmental liability

Long term environmental and economic viability

Environmental consequences of products

Best environmental performance across the life cycle

Suitable Method

Sustainability levels/Societal valuation

Monetary methods / Societal valuation

Societal valuation/ Sustainability levels

Sustainability levels



Decisions

Product oriented

Purpose of LCA

For formulating product policies

Product requirements

Government Concern

Long term environmental and economic trade-off

Prevention of environmental problems to other media

Suitable Method

Sustainability levels and Modeling of eventual effects

Sustainability levels and Modeling of eventual effects

Decisions

Market oriented

Purpose of LCA

Dissemination of product information

Green procurement

General communication

Government Concern

Formulating product information

Aiding purchasing of environmentally benign products

Educating the public

Suitable Method

Sustainability levels and Modeling of eventual effects

Monetary methods/
Sustainability Levels

Societal valuation and Sustainability levels

Decisions

Strategic oriented

Purpose of LCA

General policy development

Waste management and Recycling polices

Cleaner technologies

Government Concern

Economic & Trade-off.
Environmental

Environmental performance of product its across life cycle

Alternate solutions for cleaner production

Suitable Method

Monetary methods

Sustainability levels and Modeling of eventual effects

Societal valuation and Sustainability levels

Decisions

Purpose of LCA

Consumer /Public body's Concern

Suitable Method

Product oriented

Purchasing decisions

Environmental liability at use phase of product

Monetary methods and Sustainability levels

Market Oriented

Choosing suppliers

Environmental liability of suppliers

Sustainability levels and Modeling of eventual effects

Invest oriented

Investments in durable goods

Enhancing environmental performance of products

Societal valuation and Sustainability levels

Strategic oriented

Choice of consumption pattern

Alternate solutions for cleaner production

Societal valuation and Sustainability levels

Final Remarks

The selection of valuation method in LCA depends upon two factors (i) who is users of LCA viz. industry, consumer organization/ public bodies and (ii) the type of decisions viz. product, market, investment, and strategy oriented decisions. So, it is quite possible that for a product related decisions each user may opt to chose different valuation method. Therefore, the LCA results must be interpreted with a great care and this reinforce only one point that LCA doesn't decide for the decision maker but only helps you to take decisions. Hence, for all practical purposes one may have to rely on mix of valuation methods to arrive at different types of decisions.