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Facility Services Research

ACCOUNTING BASED LCA OF AN ICT NETWORK PRODUCT

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Background

- Electrical and electronics industries are a target for an increasing number of environmental policy measures.
  - EuP
- The use of the life cycle assessment (LCA) method has been suggested as an option to improve the quality of eco-design in companies.

Practical problems in process based LCA

1. Approach is very laborious
   A significant drawback for an organization operating in a cost-conscious business environment.

2. Systems included in the LCA should be determined in terms of energy and mass units (*i.e.* by MJ, kWh, kg)

3. Some inputs are typically only expressed in monetary terms in the company records
   - The purchased services and capital goods

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Purpose

The purpose of this study is to test the suitability of the input-output LCA in screening the life cycle impacts of a sophisticated ICT network product by using readily available accounting data.

- IO-LCA approach *per se* is still thought to be less adequate for detailed LCA studies.
- European commission: IO-LCA would be the most suitable approach to identify the products with the greatest potential for environmental improvement.
- It would also considerably improve the exactness of evaluating the environmentally significant activities of a company.

Input-Output LCA (IO-LCA)

- The IO-LCA approaches the environmental issues by using an input-output analysis (IOA)
  - Inter-relationships between industries and households through producing and consuming commodities.
  - It makes use of "input-output" tables produced by statistical agencies.
  - The tables describe production activities in terms of the purchases of each industrial sector.
  - This information is linked to the environmental data of each sector

→ calculations of the environmental impacts of products covering the full production chain.

Benefits of IO-LCA

1. The purchased material, energy and services need to be defined only in the terms of monetary value.

2. The approach is very fast to use
   No need to collect information from all processes in the supply chain because the information is already included through the use of IO-LCA tables.

3. IO-LCA always provides a full inventory
   No need to make cut-offs in the supply chain) for the production phase of the commodity or service that is taken into account.

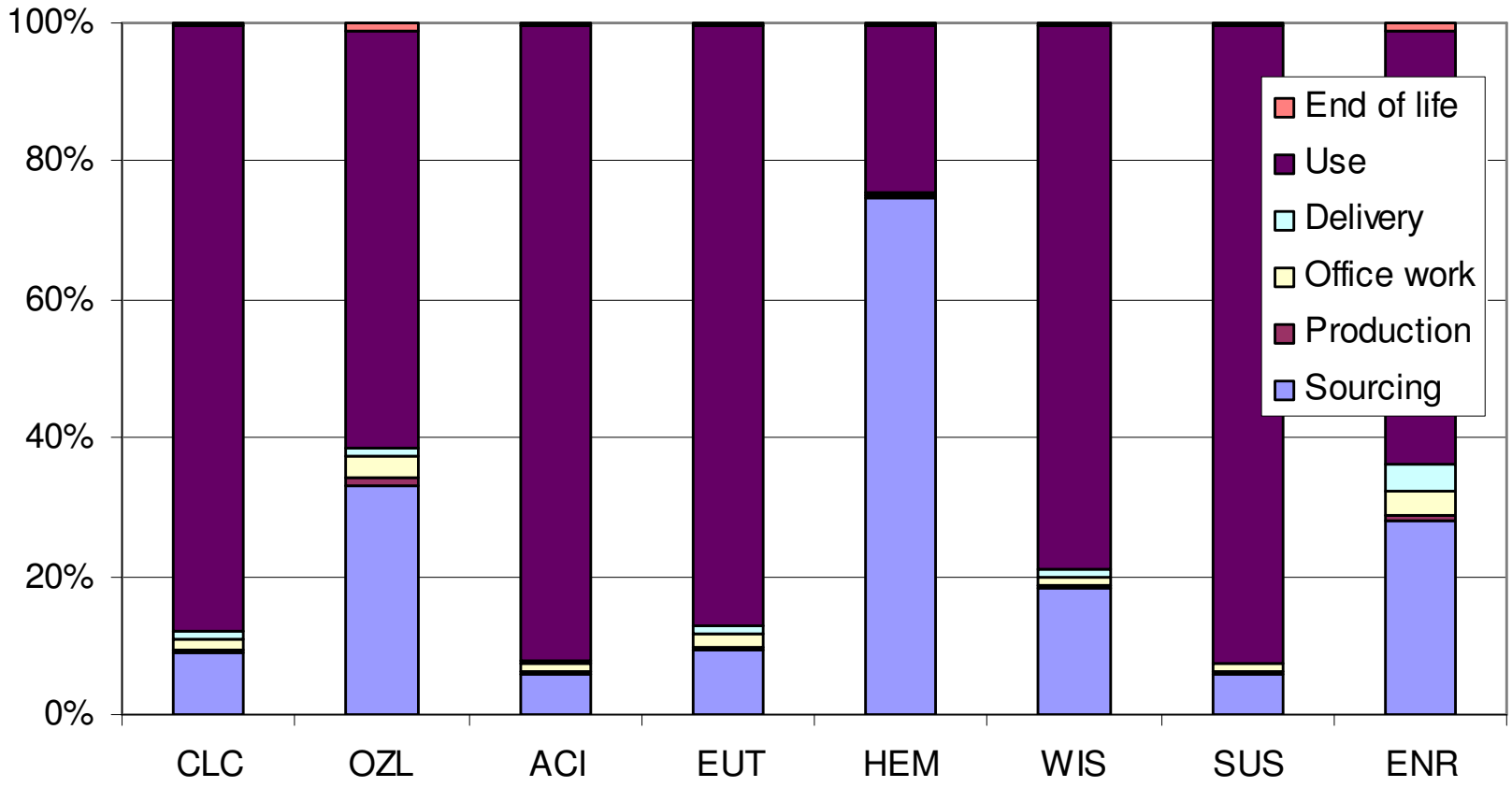
4. The environmental interventions of goods and services produced within the economy are always assessed consistently.

Research desing

1. The product system under study was defined
2. Primary accounting data were collected for all the life cycle phases of the product system.
3. The life cycle phases with the highest contribution were determined by using IO-LCA
4. More detailed data were collected for the life cycle phases with the highest contributions
5. The environmental impacts were recalculated by using the more specified data
6. The life cycle phases and processes with the highest contribution were determined

The life cycle contribution

ICT network product



CLC= Climate change
OZL= ozone layer depletion
ACI= acidification
EUT= eutrophication
HEM= heavy metals
WIS= winter smog
SUS= summer smog
ENR= energy resources

Discussions 1/2

- The use phase, and to some extent the sourcing, contributed the most to the environmental impact
  - Operating energy had the most impact – as expected
- Also sourcing from other manufacturing companies were recognized as important
  - ozone depletion and summer smog
- It appears that the IO-LCA approach can be used to identify the environmentally significant life cycle phases by using readily available accounting data.

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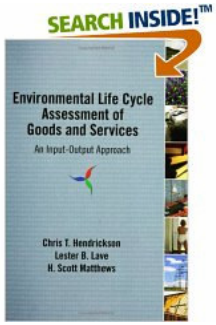
Discussions 2/2

- Practical benefits of using the IO-LCA were recognized:
  - The approach was very fast to use
  - It allows a wider environmental testing of products in companies
  - The subjective cut-offs of minor processes were avoided by having the full inventory of the supply chain.
  - As the approach uses monetary flows, it would allow the testing of new products already in early conceptual design phase in which typically only the cost estimates of the new product are available.

- The IO-LCA approach was found clearly to offer added value to the environmental management of companies.

Additional info

- **www.eiolca.net**
  Economic input-output life cycle assessment
  by Garnegie Mellon University



- **Environmental Life Cycle Assessment of Goods and Services:** An Input-Output Approach
  Chris T. Hendrickson et al. (2006)

- Research project @ TKK
  Environmental and economic life cycle modeling of products in light and service industry companies
  → **http://www.cem.tkk.fi/fsr/Lihas/**

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Thank you !

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