Life Cycle Assessment

Considering the entire life-cycle of a product requires a thorough examination of its environmental, social, and economic impacts from creation to disposal. It consists of around 90 items that need to be evaluated and extensive inside information that a company will not release to the public. This is why specialists and scientists are who such an assessment. Most times companies create LCAs for their own products. One such example is Levi's assessment for their jeans.

Some questions that can enable you to adopt a life cycle mindset are:

Raw Materials

1. Source:

- Where do the raw materials come from?
- Are they renewable or non-renewable?
- Are they sourced sustainably?

2. Extraction:

- What methods are used to extract the raw materials?
- What are the environmental impacts of extraction (e.g., habitat destruction, pollution)?
- Are there social or ethical concerns associated with the extraction process (e.g., labor conditions, indigenous rights)?

Production

3. Manufacturing Process:

- What are the main inputs (energy, water, chemicals) required for production?
- What type and amount of waste or emissions are generated during production?
- Are there opportunities to reduce waste or emissions?

4. Labor and Community Impact:

- What are the working conditions for employees in the production process?
- Are workers paid fair wages and treated ethically?
- How does production impact local communities?

Distribution

5. Transportation:

- How far does the product travel from production to consumer?
- What modes of transportation are used, and what is their environmental impact?
- Are there more sustainable transportation options available?

6. Packaging:

- What materials are used for packaging?
- Is the packaging recyclable, reusable, or compostable?
- Can packaging be minimized without compromising product integrity?

Usage

7. Product Use:

- What resources (energy, water, etc.) does the product consume during use?
- What is the product's lifespan?
- Are there any health or safety concerns associated with using the product?

8. Efficiency:

- Is the product energy-efficient or resource-efficient?
- Are there alternative products that are more efficient or have a lower environmental impact?

End-of-Life

9. Disposal:

- How is the product disposed of at the end of its life?
- Is it recyclable, biodegradable, or destined for landfill?
- Are there take-back or recycling programs available?

10. Environmental Impact:

- What are the environmental impacts of the product’s disposal?
- Does the product release harmful substances when disposed of?

11. Circular Economy Potential:

- Can the product or its components be reused, repurposed, or upcycled?

- Are there opportunities to design the product for a circular economy?

Broader Considerations

12. Overall Environmental Impact:

- What is the overall carbon footprint of the product?

- What is the overall water footprint of the product?

13. Social Impact:

- What are the social impacts across the product's life-cycle?

- Are there any benefits to local communities or economies?

14. Economic Viability:

- Is the product economically viable in the long term?

- Does the product contribute positively to the economy without causing harm?

Improvements and Alternatives

15. Design Improvements:

- Can the product be redesigned to reduce its environmental impact?

- Are there alternative materials or processes that could be used?

16. Consumer Awareness:

- How can consumers be informed about the life-cycle impacts of the product?

- What choices can consumers make to reduce the product's overall impact?

Some key resources and references that underpin these concepts by covering methodologies, principles, and case studies:

1. ISO Standards for Life Cycle Assessment:

- ISO 14040:2006 - Environmental management — Life cycle assessment — Principles and framework.

- ISO 14044:2006 - Environmental management — Life cycle assessment — Requirements and guidelines.

2. Life Cycle Assessment Textbooks and Guides:

- "Life Cycle Assessment: Theory and Practice" by Michael Z. Hauschild, Ralph K. Rosenbaum, and Stig Irving Olsen.

- "The Hitch Hiker's Guide to LCA: An Orientation in Life Cycle Assessment Methodology and Applications" by Henrikke Baumann and Anne-Marie Tillman.

3. Sustainable Product Design Literature:

- "Cradle to Cradle: Remaking the Way We Make Things" by William McDonough and Michael Braungart.

- "Design for the Real World: Human Ecology and Social Change" by Victor Papanek.

4. Government and NGO Resources:

- U.S. Environmental Protection Agency (EPA) - Resources on Life Cycle Assessment and Sustainable Materials Management.

- European Commission - Integrated Product Policy and Life Cycle Assessment resources.

5. Academic Journals and Articles:

- Journal of Industrial Ecology.

- The International Journal of Life Cycle Assessment.

6. Non-Profit Organizations:

- The Ellen MacArthur Foundation, which focuses on promoting a circular economy.

- The Global Reporting Initiative (GRI), which provides standards for sustainability reporting.