Life Cycle Assessment on fashion industry: four case studies

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INTRODUCTION ON THE FASHION INDUSTRY

- RAW MATERIAL: 1.3 Tons
- WATER CONSUMPTION: 104,000 L
- CO2: 654kg
- NEW CLOTHES: 26kg
- CLOTHES THROWN AWAY: 11kg

THE ENVIRONMENTAL IMPACT OF TEXTILES

10% of global greenhouse gas emissions are caused by clothing and footwear production.

This is more than all international flights and maritime shipping combined.

Sources: EPRIS (2017), UN (2018)
State of the art on the Nexus between sustainability, fashion industry and sustainable business model

Caterina De Ponte *, Marco Ciro Lisio **, Paolo Sospiri ***, ****

PREVIOUS STEP ON THE TOPIC

**CATEGORIES ANALIZED**

**TEXTILE**  **FOOTWEAR**  **LEATHER**

**TREATMENT TECHNOLOGIES**  **SUSTAINABLE PROCESSES**  **ORGANIZATIONAL STRATEGIES**

**RESEARCH FOR BEST PRACTICES AND SCIENTIFIC WORKS ABOUT FASHION INDUSTRY:**

| Scientific Literature research | Firm best practices research |

**CONCLUSIONS**

- Urgency to switch towards Circular Economy models in the fashion industry
- Growing interest on the theme in developing countries
- Scientific literature and firms’ best practices aligned
LIFE CYCLE ASSESSMENT - LCA

ISO 14040: principles and framework
ISO 14044: requirements and guidelines

INPUTS
RAW MATERIAL EXTRACTION → MATERIAL/PRODUCTS MANUFACTURING → USE PHASE → END OF LIFE

OUTPUTS
BOUNDARIES

Interpretation
Life cycle inventory
Impact assessment
Goal and Scope definition
<table>
<thead>
<tr>
<th>Secondary Literature</th>
<th>Firms Investigated</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scientific Procedures and Rationales for Systematic Literature Reviews</strong></td>
<td></td>
</tr>
</tbody>
</table>

### Assembling
- **Identification**
  - Research domain: Life Cycle Assessment in the Fashion Industry
  - Research questions: Benefits and Limitations of LCA in Fashion Industry
  - Source: Journals - Scopus

### Acquisition
- Search period: 2012 - 2023
- Search keywords: Boolean search using combination of words in Title, Author keywords and Abstracts.

### RESULTS
- **885**

### Arranging
- **Organization**
  - Organizing codes: Language, Documents Type, Source Type, Title and Abstract analysis, #Citations (+ Last year documents)

### Purification
- English - Research and Review articles - Journals - Correlation with the Research Domain – [> 60 or > 9/y or 2023]

### RESULTS
- **29**

### Assessing
- **Evaluation**
  - Analysis method: Contents analysis

### Reporting
- Reporting convention: words (benefits and gaps)
- Limitation: Related to data type and topic/sector considered, most cited and relevant, year of publication
RESULTS

Results by year

Results by country

Results by Subject area

Results by Source

- Journal Of Industrial Ecology
- Resources Conservation And Recycling
- International Journal Of Life Cycle Assessment
- Sustainability Switzerland
- Journal Of Cleaner Production

ITALY: 24
CHINA: 22
SWEDEN: 18
UNITED STATES: 18
FRANCE: 15
<table>
<thead>
<tr>
<th>Fields of application</th>
<th>Benefits</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| • FIRMS
• POLICIES
• MARKETING
• ACADEMIA | • Guide actions against environmental impact
• Supports SC and waste management
• Supports green marketing
• Facilitate decision-making processes
• Supports policy-making processes
• Increase process efficiency | • Difficulty to get primary data
• Could present uncertainty of the results
• Need precise conditions
• Is case dependent |
<table>
<thead>
<tr>
<th>Who</th>
<th>What</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>LEVI STRAUSS &amp; CO</td>
<td>LCA ON A PAIR OF JEANS</td>
<td>ENVIRONMENTAL IMPACT OF THE PRODUCT AND IDENTIFICATION OF HOTSPOTS</td>
</tr>
<tr>
<td>THE NORTH FACE</td>
<td>LCA ON A JACKET</td>
<td>MONITORING OF THE ENVIRONMENTAL IMPROVEMENTS DUE TO CHANGES IN THE PRODUCTION AND GREEN CLAIMS SUPPORT</td>
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<tr>
<td>NIKE</td>
<td>LCA ON GREEN LEATHER AND TRADITIONAL LEATHER</td>
<td>PURCHASE DECISION SUPPORT AFTER COMPARING THE IMPACT OF TWO PRODUCTS AND GREEN CLAIMS SUPPORT</td>
</tr>
<tr>
<td>ICEBUG</td>
<td>LCA ON A SHOE</td>
<td>ENVIRONMENTAL FOOTPRINT OF THE PRODUCT</td>
</tr>
<tr>
<td>PRIMEASIA LEATHER</td>
<td>LCA ON PRODUCTS OF THE FIRMS</td>
<td>IDENTIFICATIONS THE CRITICAL PHASES AND ENVIRONMENTAL FOOTPRINT OF THE FIRM’S PRODUCTS</td>
</tr>
<tr>
<td>HILATURAS FERRE</td>
<td>CRADLE-TO-GRAVE LCA ON ALL OF THE PRODUCTS</td>
<td>GREEN CLAIMS SUPPORT AND CREATION OF A SSC</td>
</tr>
<tr>
<td>MARKS &amp; SPENCER</td>
<td>LCA ON TROUSERS IN DIFFERENT SCENARIOS</td>
<td>COMPARISON BETWEEN RAW MATERIALS ALTERNATIVES AND ENVIRONMENTAL FOOTPRINT OF A PRODUCT</td>
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<tr>
<td>CHARGEURS LUXURY MATERIALS</td>
<td>COLLABORATION ON LCA CASE STUDY FOR LCAS OF COMBED WOOL BATCHES USING BLOCKCHAIN</td>
<td>NEW TECHNOLOGIES AS A SUPPORT TO OVERCOME LIMITATIONS OF LCA IN TERMS OF PRECISION AND DATA GATHERING</td>
</tr>
</tbody>
</table>

SECONDARY LR
O-LCA

- Images source: UNEP-SETAC
PRELIMINARY CONCLUSIONS

OUTCOME

• LITERATURE REVIEW
• PROMOTION OF LCA AS ENABLER FOR SBM
• OLCA TO FACILITATE SMEs ASSESSMENT

LCA MAIN ADVANTAGES

Get an overview of the overall impacts, to identify hotspots and areas for improvements

Measure and follow-up the environmental performances

Provide basis for strategic decisions
NEXT STEPS

6,300 FASHION-RELATED FIRMS
OVER 37,000 PEOPLE
FOOTWEAR = 15% REGIONAL MANUFACTURING

FOUR CASE STUDIES

TEXTILE
FOOTWEAR
OLCA
LEATHER
ACCESSORIES

MARCHÉ REGION

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Thank you