SIMPLIFIED LCIA FOR CONSUMER PERCEPTION OF A T-SHIRT

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1. Introduction

Part of PhD project (SMDTex-2015-3) in sustainable design and management of textiles, focusing on consumer perception of ethical fashion

- Consumer demand
  - UNEP, 2010
- Consumer awareness and perception
- The concept of ethical fashion: themes
- Approach to compare impacts assessed by LCA methodology and perceived impacts from consumers
- Life cycle impact assessment (LCIA) results of a T-shirt have been simplified from a consumer perspective in a visualized way

1.1 Ethical Fashion

Consumer perception

- Experience
  - Brand
  - Story
  - Promise
- Product: Garment
  - Quality
  - Lifetime
  - Need
1.1 Ethical fashion

**Ethical concepts, keywords, criteria, and manifesto**

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**Future Fashion**
- un-conventional

**Ethical Fashion**
- Conscious Design
- Ethical Design
- Design-to-recycle
- Ethical Fashion
- Circular Economy
- CSR
- CnSR
- Corporate Social Responsibility
- Consumer Social Responsibility
- Sustainable Fashion
- Green Fashion
- Slow Fashion
- Circular Fashion
- Fair Fashion
- Upcycling
- Meaningful
- Responsible
- Organic
- Non-toxic
- Safe
- Beautiful
- Reduce
- Bio
- Free
- Eco
- Locally
- Less
- Less waste
- Small repairs
- More meaning
- Transparency
- Quality
- Certified

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### 1.1 Ethical Fashion

**Slow fashion concept**

- The slow food movement: **focus on local and small producers**
  
  [Kahn, 2009]

- **Slow Fashion Award:** high quality realised through design, and fair labour conditions
  
  [Slow Fashion, 2010]

- Impact due to chemical products, exploitation of finite resources, and the causing of high CO2 emissions
  
  [Chouinard and Brower, 1997]

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**TO REDUCE THE NEGATIVE ENVIRONMENTAL IMPACT AND ETHICAL ISSUES OF FASHION AND ITS PROCESSES**

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**References**

[Kahn, 2009]

[Slow Fashion, 2010]

[Chouinard and Brower, 1997]
#04 – Recyclage
Des fibres recyclées (même synthétiques) peuvent avoir un impact écologique moins négatif que de nouvelles fibres naturelles. Stoppons la production de nouvelles fibres synthétiques toxiques du pétrole et recycles celles qui ont déjà été produites pour préserver les ressources.

#05 – Upcycling
Offrez une seconde vie à un vêtement tout en donnant libre cours à sa créativité. Permettez de réinventer le vêtement et de donner une nouvelle vie à vos vêtements.

#06 – Zéro déchet
Les produits de nettoyage qui éliminent le pétrole et les déchets qui causent des dommages environnementaux sont à éviter. Essayons de faire des produits naturels de qualité et de consommer de manière responsable.

#07 – La culture biologique
La culture biologique est le processus de production de vêtements qui visent à réduire les impacts environnementaux. Ils sont conçus pour être durables et responsables envers l’environnement.

Pour nous, le fait-matière est un passe-temps de qualité, qu’on en soit l’auteur ou qu’il soit le fruit d’un créateur. C’est également un moyen de créer du lien et de la proximité avec la personne qui a conçu le vêtement ou l’accessoire.

Animal Friendly
#17 – Matières Vegan
Les matières végétales et végétales sont de plus en plus utilisées dans la production de vêtements. Elles sont durables et respectueuses de l’environnement.

Eco-Friendly
#18 – Seconde-main
Trouver des pièces différentes dans des tendances proposées par les enseignes, relooker sans se casser. C'est un moyen d'éviter le gaspillage.

EcoFashion
#19 – Location de vêtements
La location de vêtements permet d'exister sans saigner à vue. Elle a tendance à donner un dressing composé de pièces qui l'on aime et qui sont régulièrement portées.
### Table 1.1 Most important sustainable methods

<table>
<thead>
<tr>
<th>Sustainable methods</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) use of organic fibres</td>
</tr>
<tr>
<td>(ii) reuse and recycling of materials</td>
</tr>
<tr>
<td>(iii) vintage practices and second hand</td>
</tr>
<tr>
<td>(iv) clean technologies</td>
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<tr>
<td>(v) green certifications</td>
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<tr>
<td>(vi) green product and process design</td>
</tr>
</tbody>
</table>

Concept of ethical fashion: Caniato et. al., 2012

### Table 1.2 Main impact categories

<table>
<thead>
<tr>
<th>Impact categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) total raw material or resource consumption</td>
</tr>
<tr>
<td>(ii) atmosphere and water impacts</td>
</tr>
<tr>
<td>(iii) toxicity</td>
</tr>
</tbody>
</table>

Impact categories of fashion: Zhang et. al., 2015
2. Approach

- the life cycle impact assessment (LCIA) results of a T-shirt have been simplified from a consumer perspective in a visualized way as described by the following steps:

1. Ethical fashion themes and consumer communication

2. LCA of a T-shirt

3. Consumer perception training and survey of T-shirt life cycle

4. Comparing simplified and perceived LCA

2.1 Ethical fashion themes and consumer communication

*Sustainable themes and communication with images*

4 Ethical-Environmental Fashion Themes

| A. Green  | Communication with images |
| B. Organic |                          |
| C. Recycling/Re-use |                        |
| D. Reduce |                          |
2.1 Ethical fashion themes and consumer communication

Consumer survey with images

300 responses, select five most relevant images for each of the four themes

Les Thèmes de la Mode Écologique

https://surveynuts.com/surveys/table?id=137381&c=2941900857TvHl

A. GREEN

B. ORGANIC
2.2 LCA of a T-shirt

Simplified LCIA is visualized in the life cycle model using bubble chart, see Table EF ranking scale for impact percentages and the four colorized themes a-d:

<table>
<thead>
<tr>
<th>A. Green</th>
<th>B. Organic</th>
<th>C. Recycling/ Re-use</th>
<th>D. Reduce</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atmosphere</td>
<td>Water</td>
<td>Disposal</td>
<td>Material</td>
</tr>
<tr>
<td>Toxicity</td>
<td>Resource</td>
<td>Water</td>
<td>Water</td>
</tr>
</tbody>
</table>

- (1) Abiotic depletion (ADP elements)
- (2) Abiotic depletion (ADP fossil)
- (3) Acidification potential (AP)
- (4) Eutrophication potential (EP)
- (5) Global warming potential (GWP)
- (6) Photochemical ozone creation potential (POCP)
- (7) Ecotoxicity potential (ECP)
- (8) Human toxicity potential—cancer (HTPC)
- (9) Human toxicity potential—non-cancer (HTPNC)
- (10) Water use (WU)
2.2 LCA of a T-shirt

Simplified LCIA

*only focusing on Ecosystems and Resources = Environmental impacts, excluding Humans; and End-of-Life/Disposal (no recycling)

Zhang et al., 2015

2.2 LCA of a T-shirt

LCIA

A. Green
B. Organic
C. Recycling/Re-use
D. Reduce
2.3 Consumer perception training and survey of the T-shirt life cycle

- perceived impacts from consumers

_Simplified from a consumer perspective in a visualized way_

20 trained consumers had rated their perception,
of the 4 themes,
in the 7 phases of the T-shirt lifecycle,
from (1) more EF to (5) less EF.
2.3 Comparing simplified and perceived LCA

Comparison between the 2 LCIA of the T-shirt highlights the gaps between the environmental impacts of the product and the perceived ones

- One of the seven life cycle phases of a T-shirt match in subjective perception and the real data: 1. Resources
- In this example, manufacturing and dyeing is perceived as highly impacting
- Generally impacts are rated as high, i.e., people are aware of impacts

Simplified LCIA

Comparing perceived LCA to simplified LCIA

3. Conclusion

- Tool to identify and quantify image of fashion products in terms of environmental impact or friendliness (EF)
- Subjective assessment often differs from the real life cycle assessments
  - contemporary ethical fashion offers several solutions
  - necessity for more information
    - provision of useful information can enhance the consumer decision making process for ethical fashion products
  - evaluation tools such as LCA are helpful to determine the real value
    - marketing tools to promote the sustainable value towards the consumer

Limitations and future work:

- "Some life cycle stages are simplified, such as cotton cultivation (background LCIs), transportation, and end-of-life disposal (no recycling):"
- further testing of acceptance of concepts, for different fashion products, and for recycling
Acknowledgements

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Thank you.