Challenges in Data Collection of Laundry Washing Behaviour via Consumer Surveys

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Workshop: The influence of consumer behaviour on the environmental footprint of products.
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Structure

• Why is laundry important for LCA?
• Consumer research: Methods and examples
  1. Quantitative surveys
  2. Interviews and focus groups
  3. Observations
  4. Diary keeping and probes
  5. Experiments and field trials
  6. Secondary sources
• Future outlook and conclusions
Use phase:

Often the most energy demanding phase of laundry products’ life cycle.
Water and energy consumption

UN World Water Development Report
Cotton t-shirt

Washed at 60°C and tumble dried
Assumed lifetime: 25 washes
Total energy use 109 MJ
(Source: Allwood et al 2006)
Clothes environmental contribution: LCA on energy consumption

Primary energy profile of different life stages for 4 garments

- **Cotton T-shirt**: (250g) 25 washes at 60°C, tumble dried and ironed.
- **Viscose blouse**: (200g) 25 washes at 40°C, hang dried.
- **Cotton briefs**: (72g) 104 washes at 50°C, tumble dried every 2nd time.
- **Polyester trousers**: (400g) 92 washes at 50°C, tumble dried every 2nd time, ironed.

References:
- Allwood et al. 2006;
- Collins and Aumônier 2002
Emissions arising from 50 “wears” of a cotton t-shirt, with varying assumptions regarding longevity of the t-shirt

<table>
<thead>
<tr>
<th>Emissions for 50 wears [kg CO₂]</th>
<th>(50 shirts)</th>
<th>(12 shirts)</th>
<th>(4 shirts)</th>
<th>(2 shirts)</th>
<th>(1 shirt)</th>
<th>(0.5 shirt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>One use</td>
<td>368</td>
<td>98</td>
<td>38</td>
<td>22</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>4 uses</td>
<td></td>
<td></td>
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<tr>
<td>12 uses</td>
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<td>25 uses</td>
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<td>50 uses</td>
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<tr>
<td>100 uses</td>
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</tbody>
</table>

Source: Carbon Trust 2011
Towards sustainable laundering

- Decreasing washing frequency
- Using alternative freshening methods such as airing and spot cleaning
- Lowering washing temperature: ten degrees reduction saves about 0.23 kWh (but large variations)
- Using eco-programs saves about 0.27 kWh/wash compared to cotton cycle
- Loading to the full capacity of the machine and selected washing program
- Correct detergent dosing
- Avoiding tumble-drying and ironing
- Product selection (eco-labels, energy label, easy-care textiles)
Factors influencing consumer behaviour

<table>
<thead>
<tr>
<th>Social and cultural aspects</th>
<th>Environmental influences</th>
<th>Psychological</th>
<th>Personal</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Reference groups</td>
<td>• Economic</td>
<td>• Motivation</td>
<td>• Age &amp; gender</td>
</tr>
<tr>
<td>• Subculture</td>
<td>• Political</td>
<td>• Beliefs</td>
<td>• Life stage</td>
</tr>
<tr>
<td>• Status</td>
<td>• Technological</td>
<td>• Attitudes</td>
<td>• Education</td>
</tr>
<tr>
<td>• Social class</td>
<td>• Markets</td>
<td>• Learning (memory)</td>
<td>• Occupation</td>
</tr>
<tr>
<td>• Family</td>
<td>• Legislation</td>
<td>• Perception</td>
<td>• Economic situation</td>
</tr>
<tr>
<td>• Social norms</td>
<td>• Infrastructure</td>
<td>• Intentions</td>
<td>• Habits</td>
</tr>
<tr>
<td></td>
<td>• Situation</td>
<td>• Values</td>
<td>• Skills</td>
</tr>
</tbody>
</table>
Primary research based on information from users

Asking directly gives subjective information, answers may be affected by aspects such as social desirability and prestige response bias.

Difficulties when studying factors that respondents do not know, are not aware of, or vary a lot.

Laundering includes some socially or morally loaded topics, such as personal hygiene and sustainable behaviour.
Quantitative surveys

- Answers questions like how much or how many
- Often questionnaires with multiple choice answers
- Suitable for studying large populations
- Measuring aspects that affect behavior such as attitudes
- Specific questions and topics
- Potential to measure change over time
- Possible to answer anonymously for sensitive information
- Other methods may be more suitable for studying behavior
Survey - specific question: Washing temperature of cotton t-shirt in Norway and Spain

<table>
<thead>
<tr>
<th>Washing temperature</th>
<th>Spain 2002</th>
<th>Norway 2002</th>
<th>Norway 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold water</td>
<td>48%</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>30°C</td>
<td>40%</td>
<td>3%</td>
<td>6%</td>
</tr>
<tr>
<td>40°C</td>
<td>9%</td>
<td>44%</td>
<td>68%</td>
</tr>
<tr>
<td>60°C</td>
<td>3%</td>
<td>48%</td>
<td>20%</td>
</tr>
<tr>
<td>90°C</td>
<td>0%</td>
<td>3%</td>
<td>0%</td>
</tr>
</tbody>
</table>

(2002 data from Arild et al)
Average number of washing cycles per week

- Cotton: Sum: 7.86
- Short: Sum: 7.22
- Eco: Sum: 7.86
- Synthetics: Sum: 7.86
- Wool/silk: Sum: 7.86
- By hand: Sum: 7.86
- Delicates: Sum: 7.86

Temperature:
- 40°C: Sum: 7.86
- 60°C: Sum: 7.86
- 30°C: Sum: 7.86
- 90°C: Sum: 7.86
- 50°C: Sum: 7.86
- Cold water: Sum: 7.86
- 70°C: Sum: 7.86

Average household size 3.1 persons (survey 2010)
Diaries: Often more frequent laundering than informants estimated beforehand.
Interviews & focus groups

Exploratory research
Understanding of range of ideas or feelings
Answer why and how questions
For studying aspects that influence decision making: motivations, needs, believes, thoughts, experiences, attitudes
Rich, detailed data (possible to include some non-verbal aspects)
If small samples: not possible to generalize
Individual interviews better for in-depth studies and sensitive topics than groups
Focus groups: Possible to put together groups with similar or varying backgrounds and opinions. Possible to reach consensus or see where disagreements occur.
Interview with Olivia, 67

«I do not think I’ve used 95°C for a very long time. I did before for washing towels, but not anymore. […] Detergents are more efficient, so 60°C is actually enough. We do not have that dirty things. And I use a bit of stain remover if needed.»
Diary/journal keeping and probes

Participants are given tools to record their behaviour.

Laundry examples:
Kruschwitz et al. University of Bonn: home visit, diary 28 days, scales for weighing detergent and laundry. 2867 wash cycles registered.
Emma Rigby, UK: Gave specific garments (probes) and their use and laundering was registered

→ Still self-reported behaviour but more accurate measures. Requires goodwill from the participants.
Watching and recording behaviour
Measuring actual behaviour instead of relying on self-reporting from users
Possible to have different levels of participation (ethnography)
Experiments and field trials

Sweaty textiles and consumer panel for evaluation of odour:

Could you use this clothing for indoor training or would you wash it?
Tullia Jack, Australia:
- Asked informants to wear the same pair of jeans for at least five days a week over a three month period without washing them.
- Survey, intervention, and interviews.
- Study what is needed to achieve change
Laboratory tests:
Laundry can get cleaner at 30°C than at 40°C

Cleaning effect of four detergents at two washing temperatures

<table>
<thead>
<tr>
<th>Det.</th>
<th>30 °C</th>
<th>40 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Det. A</td>
<td>55</td>
<td>58</td>
</tr>
<tr>
<td>Det. B</td>
<td>62</td>
<td>65</td>
</tr>
<tr>
<td>Det. C</td>
<td>53</td>
<td>54</td>
</tr>
<tr>
<td>Det. D</td>
<td>60</td>
<td>63</td>
</tr>
</tbody>
</table>
Secondary sources

Start to get an overview of existing data such as:

- Sales numbers
- Water and electricity consumption
- Production data
- Import and export statistics

A.I.S.E. 2015
Future outlook

Opportunities
New technologies ease registrations. RFID laundry tracking tags and sensors that detect motion, humidity, temperature, pressure, etc.
Increased interest, transparency and availability of information
Improved products, such as automatic detergent dosing

Challenges
Increased amounts
Cleanliness vs. sustainability
To conclude...

Many possibilities to study consumer behavior and aspects that affect it.

Using mixed methods or method triangulation is especially beneficial when acquiring knowledge on matters where there may be a difference between what people think, say, or do.

Choose method based on what you want to know. Consider if consumers can answer it or if the information should be acquired differently.
Thank you!

Questions or comments?

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Twitter: @KirsiLaitala
References


Klepp, I.G. 2003 Fra rent til nyvasket: skittent og rent tøy. Sifo, Oslo


