



Waste audit interviews

A method for understanding the link between intrinsic quality and apparel lifespans

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16th April, 2024

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BACKGROUND

Advancements in the regulation of clothing and textiles in the EU necessitate a deeper understanding of the products, encompassing their usage patterns, duration of use, and strategies for prolonging their lifespan and enhancing utilization rates.

We have developed a new method for this purpose, and hope that it will be funded to guide the regulation processes within clothing. This note gives an overview of the method and the project proposal with a rough budget estimate.



Existing methods

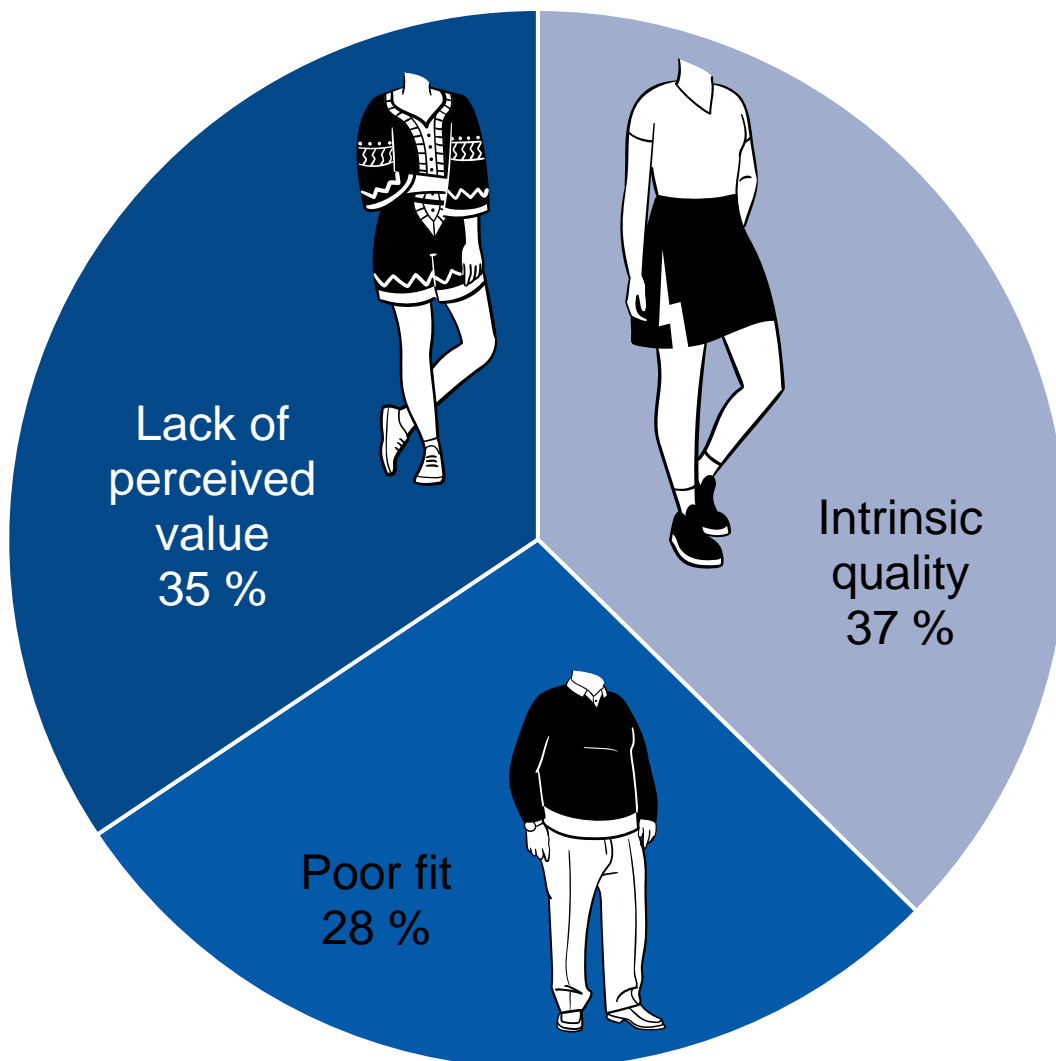
Presently, our primary tools for achieving this understanding include wardrobe studies and waste audits¹, in addition to traditional consumer research approaches such as surveys and interviews.

A novel approach: Waste audit interviews

Drawing inspiration from existing research methodologies, we have devised a novel approach that is faster than conventional wardrobe studies but includes more detail about the use phase than waste audits or consumer surveys normally provide. Further, the method connects the real use of clothing with results measured in a laboratory related to physical durability. This approach shows that it is feasible to measure the use phase objectively.

Purpose and research questions

- This research proposal seeks to address a major knowledge gap by categorising the end-of-life reasons for apparel at scale and better informing lifespan prediction of new clothing.
- The method is developed to find out how different intrinsic product attributes impact the length of clothing lifetimes.
- Attributes that this study will focus on include different physical strength properties such as tensile strength, pilling, abrasion resistance, colour fastness and garment integrity, as well as size/fit, and perceived value.
- Whilst we have a good idea of how each of these three contributes to product disposal decisions², we have no science-based evidence to identify their impacts on duration of service (DoS).

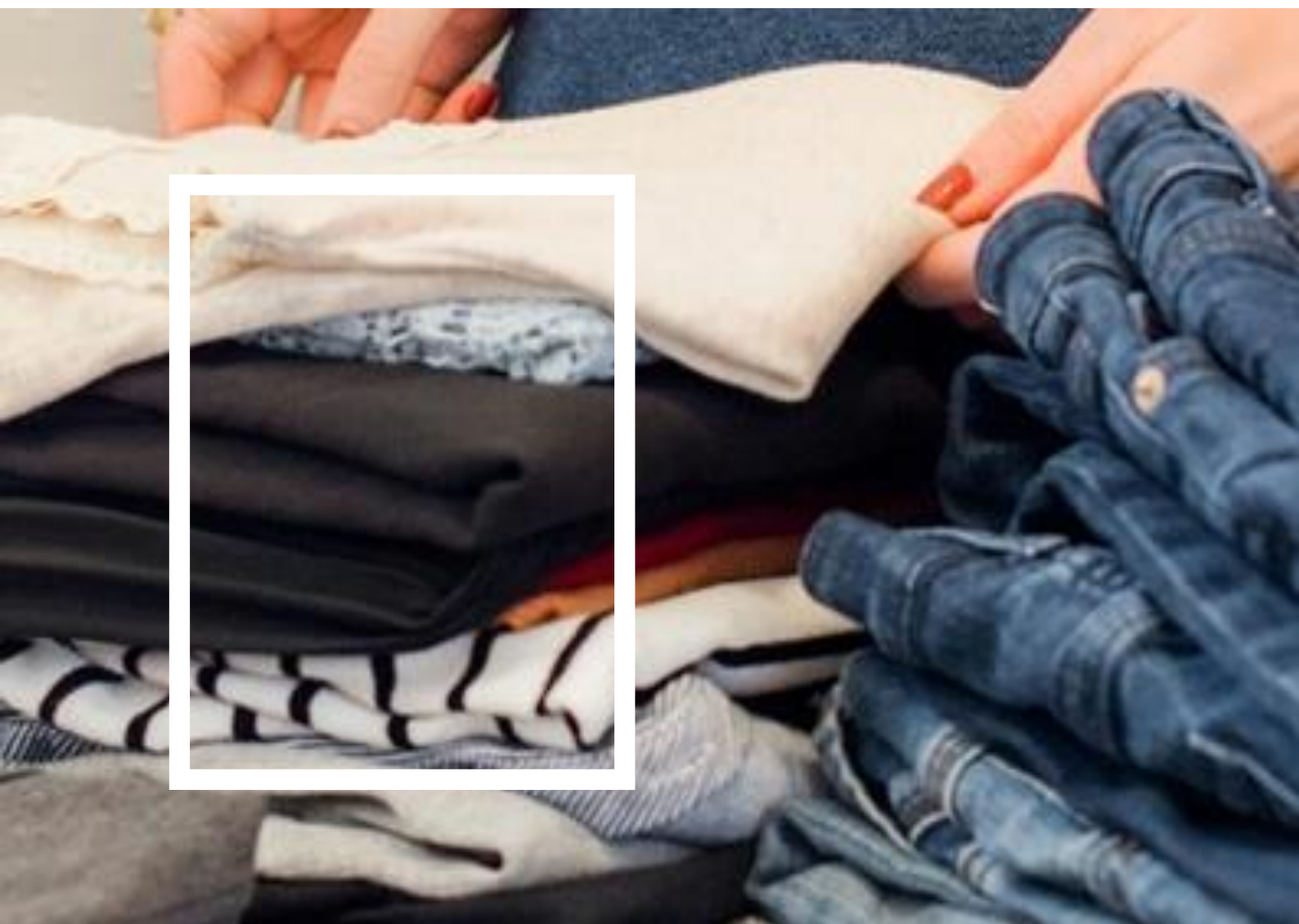


2) Laitala, K., & Klepp, I. G. (2022). Review of clothing disposal reasons. Clothing Research. <https://clothingresearch.oslomet.no/2022/10/19/review-of-clothing-disposal-reasons/>

Analysis of clothing duration of service

Due to the comprehensiveness of the study area and the need for both qualitative and quantitative data, we propose a new methodology for analysing clothing duration of service that combines data from three sources:

- 1) Consumer interviews as they dispose of clothing
- 2) Analysis of used clothing including physical laboratory tests
- 3) Data from producers on clothing production date and material qualities





Consumer interviews

We suggest the duration of service to be studied by interviewing consumers as they dispose of clothing. The interview topics include:

- Clothing lifetime (number of wears and length of ownership)
- Disposal reasons in detail
- Planned destination of clothing (municipal waste, donation for reuse, selling etc)
- Repair attempts
- Price at purchase
- Mode of acquisition (whether new or second-hand, bought on sales, online etc.)

Consumers are encouraged to set aside all unwanted items and take part in the research project and deliver clothing items that they plan to dispose of at specified times and locations, either at clothing collection containers, recycling stations or other central locations.

The recruitment can be conducted through social media in cooperation with textile collectors and the municipalities, or by cooperating with large employers and conducting interviews with their employees at workplaces. To encourage participation, gift cards will be drawn among the participants. The interviews will be recorded.

Garments are collected for the detailed registrations as specified in the next step of the study. If consumers plan to sell some items and wish to retain them, we will take photos of the garments.

Clothing registrations, laboratory tests and producer data

All of the items delivered by the consumers will be registered in detail in a database. This will include:

- Clothing category, brand and materials
- Reason for disposal
- Signs of wear and tear (type of degradation, abrasion, tear etc), if any.
- Presence of garment fit attributes such as adjustability, seam allowances and size label
- Duration of service measured in years, via consumer knowledge and via cooperation with large textile companies, such as those taking part in developing PEFCR, that can provide data on production date based on the product's SKU number. We have previously emphasized that providing the production date of clothing is important for more reliable data on the length of use phase³.
- Duration of service measured in wears per lifetime – via consumer knowledge
- Garment value attributes such as:
 - Fabric design
 - Garment style
 - Colour
 - Product life number i.e. new or second-hand
 - Price at purchase
 - Evidence of repair from the consumer or on the garment

Where available, data from production quality control on the materials' physical properties will be analysed and compared to wear & tear observations.



Laboratory tests

Laboratory analysis of physical properties will be conducted on specific selected items depending on the types of damages, garment sub-category and fabric/knit type, as specified in PEFCR v2.0.

We estimate that around 1200 tests are needed to cover all the garment sub-categories and types of damages.

National statistics will provide data on the share of clothing delivered to the various streams. This combined with data from interviews will provide a good overview of the condition of items intended either for reuse or disposal.

Disposal reasons, test methods, and clothing categories	1 T-shirts	2 Shirts and blouses	3 Sweaters and mid-layers	4 Jackets and coats	5 Pants and shorts	6 Dresses, skirts and jumpsuits	7 Leggings, tights and socks	8 Underwear	9 Swimsuits	10 Apparel accessories
Change in appearance: colour change, pilling, fuzzing, appearance of fabric and seams, broken elastane, delamination and damage of components (buttons, slide fasteners, etc.) based on ISO 15487	100	100	100	100	100	100	100	100	50	-
Tears or holes. One of methods (tear, abrasion, bursting or tensile strength) chosen based on type of damage, garment and fabric/knit: EN ISO 12947-2, ISO 13938-1, ISO 13938-2, ISO 13934-2, or ISO 13937-1	20	20	20	20	40	20	20	0	20	-
Dimensional change or spirality. Visual estimation only, based on ISO 5077 or ISO 16322-3	10	10	10	10	10	10	-	10	10	-
Pilling test ISO 12945-1/2	5	5	5	5	5	5	-	-	-	-
Elasticity/ recovery ISO 20932-1 or ISO 20932-3	-	-	-	-	5	5	-	5	5	-
Snagging ASTM D3939 or BS 8479 modified	5	5	5	-	5	5	5	-	5	-
Seam strength ISO 13936-2	5	5	-	5	5	-	-	-	-	-

Table 1: Overview of planned technical laboratory tests per product sub-categories.



Budget

- The budget is highly dependent on the sample size that will be chosen. The data should be large enough to get detailed and robust results.
- We suggest starting at minimum with three European countries with about 4000 garments from each.
- The type of product from each product sub-category to be the most typical according to Table 14 of PEFRPv2.0 which will equate to approx. 300 products per sub-category.
- Our indicative budget estimation for the proposed project is about **0.5 million Euros** incl. VAT.



Timeline

- The timeline is dependent on the chosen scope and whether potential partners are willing to participate and have the capacity to do so.
- We assume that the project takes about **a year** from initiation.



Analysis and interpretation

- The analysis will generate a report with detailed tables linking the number of wears with the key intrinsic product attributes for each of the 10 product sub-categories.
- Using the data collected from consumer interviews, laboratory test results, and product attributes it will be possible to carry out regression analyses to determine the magnitude and the percentage of contribution of each of the above attributes to duration of service in years and number of wears.
- To determine the magnitude of the DoS multiplier (currently 0.67 to 1.45 for physical testing and 1 to 1.15 for reparability) the product lifetime distribution will be statistically analysed. The nature of the distribution (normal or skewed) will determine how the DoS multiplier is quantified.
- The above data on the number of wears per lifetime (PEF definition of Duration of Service) and the number of years in service can then be compared to yield a robust proxy for Duration of Service (wears per lifetime) for future analyses where only the age of the product is likely to be known.
- Interpretation will include discussion and recommendations to capitalise on this new knowledge to improve PEF CR methodology and its relevance to the actual use and end-of-life outcomes of apparel. Application and relevance of the PEF CRs to the Ecodesign for Sustainable Products Regulation should subsequently be improved, helping deliver more environmentally sustainable and circular apparel in Europe.

REFERENCES

1. Klepp et al. (2023) USED, BUT NOT USED UP: Using textile waste to inform textile rating schemes A suggestion for empirically based policy measures to reduce the environmental impacts of clothing and footwear
<https://clothingresearch.oslomet.no/wp-content/uploads/sites/1026/2023/09/Used-but-not-used-up.pdf>
2. Laitala, K., & Klepp, I. G. (2022). Review of clothing disposal reasons. Clothing Research. <https://clothingresearch.oslomet.no/2022/10/19/review-of-clothing-disposal-reasons/>
3. Klepp et al., (2023) Revision of EU rules on textile labelling: Response to call for evidence, SIFO, OsloMet, <https://clothingresearch.oslomet.no/wp-content/uploads/sites/1026/2023/09/Textile-labelling-rules.pdf>



Suggested citation

Kirsi Laitala and Ingun Grimstad Klepp (2024) Waste audit interviews - A method for understanding the link between intrinsic quality and apparel lifespans. Consumption Research Norway (SIFO), Oslo Metropolitan University. <https://clothingresearch.oslomet.no/wp-content/uploads/sites/1026/2024/04/NewMethod.pdf>

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