

GreenDELTA



SOCIAL LCA CASE STUDY

Organic cotton sweater

OpenLCA Version: 2.0

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Abbreviations

D&R Distribution and Retail

E-LCA Environmental LCA

FWF Fear Wear Foundation

HS Hooded Sweater

LCI Life Cycle Inventory

S-LCA Social LCA

Introduction

Cotton is widely used for fabric for clothes, with over 20 million tons of cotton fibres produced every year worldwide (FAO, 2022). The most important producers of cotton are China, India and the United States. Even though the production of polyester dominates, cotton represents an important part of the market, estimated at 24% on 2020 (Textile Exchange, 2021). The production of conventional cotton has significant impacts on the environment, due to the large amounts of water and pesticides it requires. As most of consumers and manufacturers are becoming aware of those impacts, alternatives such as organic cotton are getting more and more popular. India is by far the most important producer of organic cotton, producing 50% of fibres worldwide, followed by China and Kirghizstan (Textile Exchange, 2021). The large volumes of cotton produced, and the low labour costs of the cotton garment sector makes India an attractive producing country for European retailers. However, these low prices often come at the expense of workers' conditions. Indeed, several social life cycle assessments report a decline of workers' wage over the past decades, repression against labour unions, discrimination against women (Almanza & Corona, 2020) as well as child labour, airborne and carcinogenic exposure (Roos, Zamani, Sandin, Peters, & Svanström, 2016). Noise pollution was also assessed as a significant risk to workers' health, causing fatigue and anxiety in addition to damaging the eardrum (Fibre2Fashion.com, 2007).

Social Life Cycle Assessment (S-LCA) is a holistic method used to quantify and analyse potential social impacts throughout the whole supply chain of products. This study assesses a hooded sweater (HS), produced in India and used in Germany, made with 100% organic cotton. An example of such garment is illustrated Figure 1.



Figure 1: Organic cotton hooded sweater (source: <https://en.zalando.de/>)

This case study complies with ISO 14040 (ISO, 2006), and thus consists of four major phases:

- Goal and Scope,
- Inventory Analysis,
- Impact Assessment,
- Interpretation and conclusions.

Moreover, the *Guidelines for social life cycle assessment of products* (Life Cycle Initiative, 2020) are followed to adapt to the specificities of S-LCA. The PSILCA database and documentation (Maister, Noi, Ciroth, & Srocka, 2020) are used for the openLCA model.

I. Goal and Scope

Goal

The goal of this study is to map the social impacts of the hooded sweater along its life cycle. This case is carried as an internal request from GreenDelta, to provide social LCA beginners with a methodology to carry an S-LCA using the PSILCA database.

In this study, the results cover the categories of the method Social Impacts Weighting Method from the PSILCA database (2020). The 55 impact indicators covered are listed in the annex A. This LCA focuses on the stakeholders Workers and Society. It also addresses the stakeholders Local community and Value chain actors to avoid burden shifting among different categories.

Functional unit

The functional unit chosen for this study is “1 organic cotton 2XL hooded sweater, with a weight of 750g, used for 1 year”. It is assumed that the product is worn twice a week and that it is washed once a week. The sweater is therefore washed 52 times in 1 year.

System boundary

The product is assessed in a cradle-to-grave system, from the extraction of raw materials to the disposal of the used product. The extraction of raw materials and pre-processing consists of the production of the cotton fabric, the zipper, and polyester resin. This life cycle stage, as well as the manufacturing stage, takes place in India. The product is then exported and retailed in Berlin where it is used and disposed of. The system boundary of the system as well of the foreground processes are illustrated Figure 2.

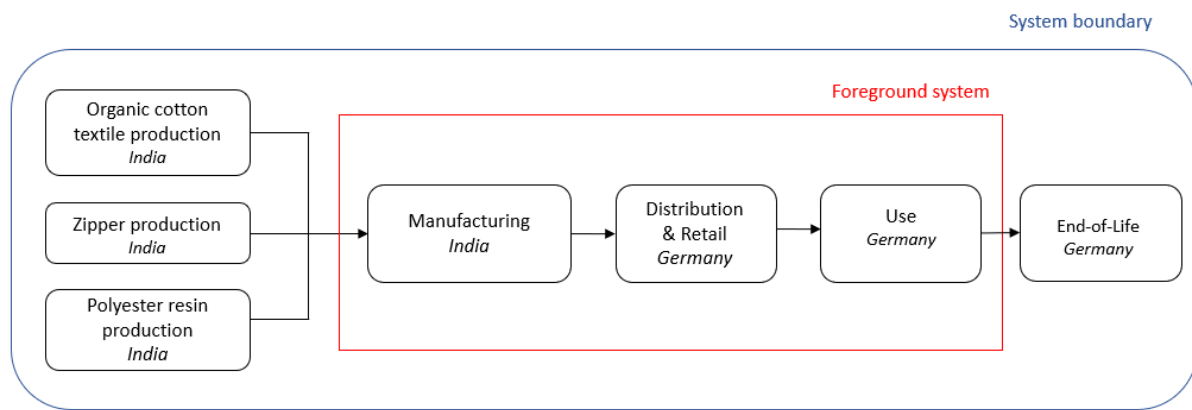


Figure 2: System boundary of the system

Scenarios

Three scenarios are made for the Use phase, with a focus on the washing activity. The base case represents the users washing the product themselves. The direct social impacts regarding the stakeholder Workers are estimated to be inexistent. The second scenario “Laundry” represents the washing of clothes by a laundry service. Finally, the washing of clothes as a service at home is assessed, representing the activity of a housekeeper or a cleaner. This third scenario is referred as “Housekeeper” hereafter.

Assumptions and limitations

The waste management services in India were approximated to transportation by truck. Indeed, the collection and transportation represent 90% of this activity (Sunil, et al., 2017). The market price of the intermediate product “Manufactured sweater” was estimated based on the values of several intermediate products from Almanza et al (2020) and the market price of the intermediate product “Distributed sweater”. The values for child employment in India are rather old (2012). During the use phase, the clothes are assumed to be washed at 60°C and air dried. The washing machine is filled with 3.8 kg of clothes over the 6 kg capacity. The market price of a washing machine cycle is estimated from the prices of Laundromats in Berlin. The waste scenario is assumed to be incineration, which is the most representative treatment for German municipal waste (Ecoinvent 3.8). No recycling or reuse of the clothes was considered due to the complexity of the recycling processes and the lack of data. The market price for incineration was extrapolated from French average values for incineration of municipal waste (Les coûts de gestion des déchets ménagers explosent, 2012).

II. Life cycle inventory

a. Modelling the foreground system

This sub-section describes how to model a foreground system and link it with background data from the PSILCA database. This step allows (1) to create the structure of the life cycle stages and processes for the foreground system of the case study and (2) to link the inputs of foreground processes to background datasets from PSILCA.

1. Collecting inputs

Methodology

- *Finding data.* There are multiple ways to collect data for this step. Social and environmental studies found in the literature can provide life cycle inventories. E-LCA databases such as Ecolnvent are also useful source of information for the background processes. The best case would be, of course, to have primary data for the foreground system.
- *Understanding the flow logic in s-LCA.* A significant difference with e-LCA is the nature of flows modelled as inputs or outputs. In social LCA, except the quantitative reference, the main output flows are the social indicators that characterize the process. Therefore, flows that are commonly modelled as outputs in e-LCA, such as waste flows, are often mapped to waste-related sectors from PSILCA and modelled as input services. However, waste can still be modelled as a “waste” flow, if the practitioner is able to model the associated waste treatment process, rather than taking a waste-related sector already available in PSILCA. Elementary flows can still be modelled as outputs or inputs but will have no influence on social LCA results. To track the mass balance or for documentation, it is possible to keep elementary flows in the social LCA model.
- *Adapting the distribution stage.* It can be difficult to assess the precise journey of a product, and which country bears the responsibility for it. Theoretically, the country responsible for the transport is the country that owns the means of transport. In practice the person carrying the study should try to find most representative journey based on the sectors and data available from PSILCA.

All the inputs for this case are taken from the E-LCA of this product realized previously (Loubert & Noi, 2022) The associated model graph from the previous environmental assessment is shown in Figure 3. All the waste flows from the former model are here considered as product flows in the inputs, modelled as waste management services. The modelling of transport was modified from the environmental model to fit the transport sectors available in the PSILCA database. The distribution from India to Berlin is therefore modelled as a road transport from the manufacturing site to Chennai, followed by the shipping from India to Germany, and finally the retailing of the sweater in Germany.

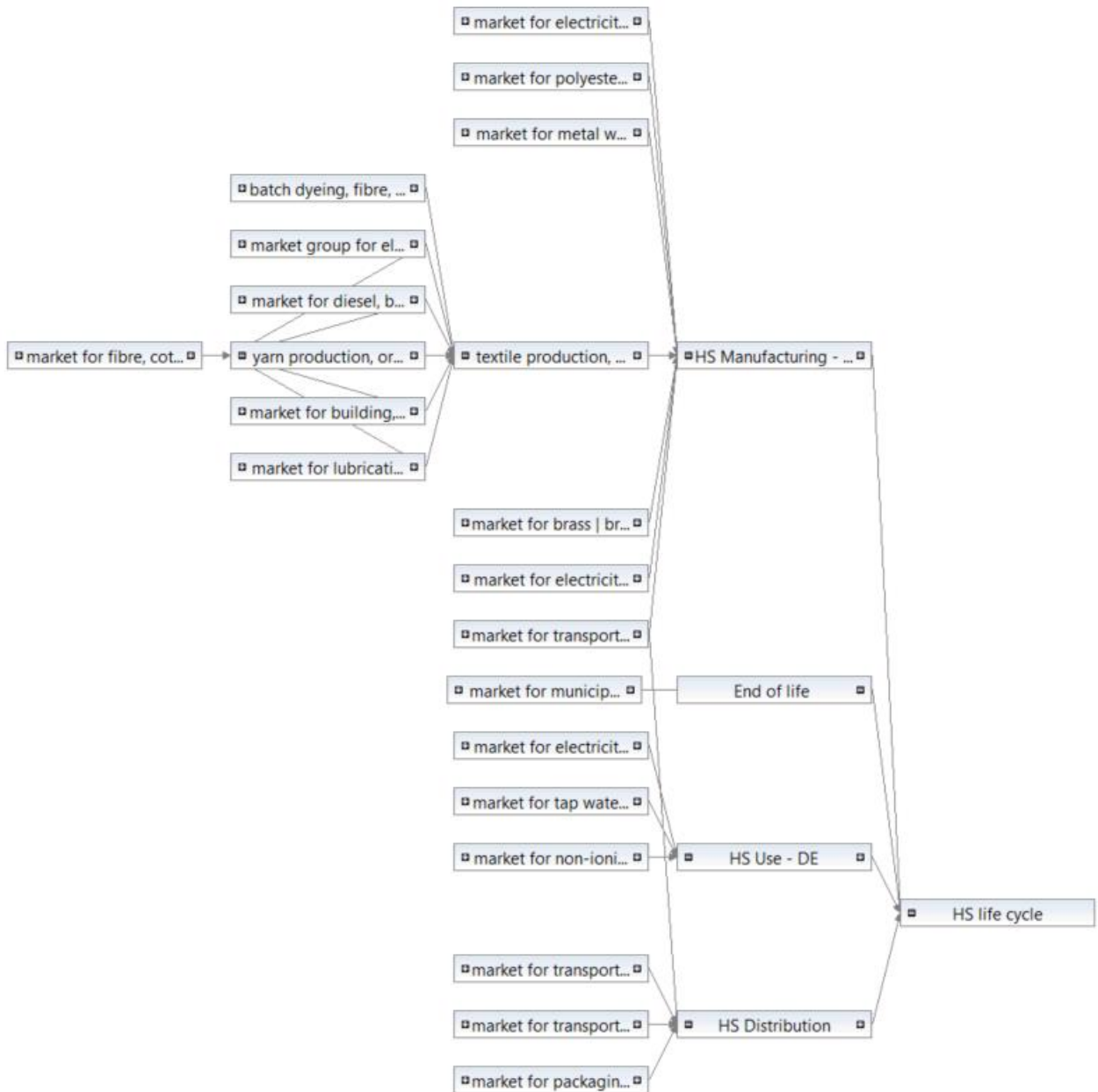


Figure 3: Model graph of the life cycle of the hooded sweater

2. Defining the PSILCA sector representing process inputs

Each item must be associated to a representative sector in order to link the model to the generic data available in PSILCA. The complete list of inputs for this product, along with associated PSILCA sectors, is given in the annex B.

Brass is approximated to be part of the sector Copper ore-IN, as copper is the main component of the zipper. The production of cotton fibre belongs to the sector Cotton- IN while the production of cotton thread and cotton knitted fabric belongs to Cotton textiles-IN.

The lack of information about the Indian waste management system, as well as its absence in the PSILCA database, required some adaptations for the model. Even though there are some waste management companies in India, waste collection is mostly driven by the informal sector, with thousands of waste pickers extracting value from household or industrial waste as their main source of income (Sunil, et al., 2017). Since 90% of the costs of waste management come from the collection and transport of waste, this service was modelled as road transport, using the PSILCA sector “Other transport” in India. The health and social issues resulting from the lack of specific infrastructures are poorly accounted for by the proxy sector Other transport-IN, which is a limit to the modelling. However, since the health risks from collecting organic cotton waste fabric are low, as well as the economic value of the input in the model, the results are not expected to be significantly impacted.

The transportation from Odisha to Chennai is modelled with the sector Other transport- IN as no sector is available for road transport specifically.

- *Understanding the classification of sectors.* PSILCA follows the economic sectoral classification in place in each country. The most common statistical classifications of economic activities are given by NACE documentation for Europe, NAICS for North America, and ISIC for the world.
- *Choosing between the PSILCA sectors “Industries” or “Commodities”.* Commodity represents the average for the provision of the good from different industries, similarly to the processes “market for...” in Ecolinvent. It is preferable to take that option for product LCAs. Industry represents the whole industry sector, which can provide more than one commodity. For instance, the industry “Mining of metal ores” can produce metal ores, steam, and other by-products.
- *Modelling the End of life stage.* The waste sector is modelled in only a limited number of countries in PSILCA. There is no straightforward way to handle this limitation, however, several alternatives can be explored: finding a broader sector that includes waste management, using another sector as a proxy if relevant (e.g. the transport sector, in case collection of waste represents a large part of the activity), or using the waste management industry from a neighboring country.
- *Handling the absence of a sector in the database.* Similarly to the modelling of end of life, it is part of the researcher’s choices and assumptions to choose a proxy which is the most representative as possible for the missing sector.

3. Quantifying process inputs with market prices

As this is a fictitious case, no LCC or similar value-evaluating data were provided by the client. Market values were therefore assessed from retailing or services websites, completed by data found in the literature.

Manufacturing

Values representative of the market were mostly taken from Indiamart and Alibaba for the Indian inputs. The price of the manufactured sweater was estimated from the LCA of a cotton t-shirt (Almanza et al. 2020) weighted by the price of the retailed product. Weighting the market price with the relative weight of the sweater was not as relevant as the t-shirt does not include the same nature of cotton (organic or conventional) nor the same portions. The market price of “Manufactured sweater” was therefore weighted with the market prices of the retailed products, according to the formula below.

$$\begin{aligned} \text{Price}_{\text{manufactured_sweater}} &= \text{Price}_{\text{manufactured_Almanza}} * \text{Price}_{\text{distributed_sweater}} / \text{Price}_{\text{distributed_Amanza}} \\ &= 5.72 \text{ USD}_{2020} * 40 \text{ USD}_{2022} / 30 \text{ USD}_{2020} \\ &= 7.6267 \text{ USD}_{2022} \end{aligned}$$

Distribution and retail (D&R)

The market price of the retailed sweater was estimated from a German garment retailer (Lotuscrafts, 2022), since this study does not evaluate the product of a specific retailer.

Use phase

A price assumption of 4 euros for a cycle of a 6 kg is made based on the price of Laundromats in Berlin.

End of life

No recycling is considered for this study due to the complexity of this path and the lack of data to model it. The whole sweater is assumed to be treated as municipal waste. French prices for the incineration of waste are used as a proxy.

The complete life cycle inventory can be found in the annex B. The exchange rates used at the time of the study are the following: 1 Indian rupee= 0.012 \$₂₀₂₂; 1 €₂₀₂₂=0.96 \$₂₀₂₂; 1 \$₂₀₁₅= 1.25 \$₂₀₂₂; 1 \$₂₀₁₉= 1.16 \$₂₀₂₂; 1 \$₂₀₂₀= 1.14 \$₂₀₂₂.

- *Finding the market price.* LCC may be provided by involved companies. Information can alternatively be found in the literature, on large retailers' website (e.g. Amazon), or prices found on the market for services. As prices can be found in a large range, it is recommended to use an average value of the market, validated by the commissioner of the study if feasible, and document the reference year and exchange rate.
- *Handling double counting.* It might be relevant in some cases to subtract the values of raw materials or intermediate product from downstream processes. This is specific to each study.
- *Converting to USD2015.* The economic flow properties are United States Dollars, which mean every input must be converted in this currency to be implemented in the model. As the reference year of PSILCA v.3 is 2015, it is also required to take into account the variation of currency since 2015.
- *Managing data.* The template below offers an example of how data can be collected. The market price of the quantitative reference is not required when entering it in the model, however it will be used to calculate the worker hours in the second part of the life cycle inventory.

Process											
Input/Output	Item	Country	PSILCA sector	Amount	Unit	Market price	Unit	Source		Output price (\$2022)	Output price (\$2015)
In											
In											
...											
Quantitative ref.											
Social outputs	Item	Country	Data source	Raw value	Unit	Risk level	Unit labour cost	Mean hourly wage	Source (PSILCA sector)	Worker hours (h)	

b. Adding social indicators to the foreground system

The foreground system is here investigated to understand and evaluate site-specific social challenges. More precisely, relevant social indicators are selected, and their associated risk level are quantified for each process of the foreground system. The selection of social indicators is based on the goal and scope of the LCA. In this study a special attention is given to the indicators regarding workers and society. However, to identify social hotspots and avoid burden shifting, the indicators regarding local community and value chain actors are also covered. As shown in the LCI in the annex B, the social outputs collected fall into two groups: specific data when it could be found, completed with indicators from representative PSILCA sectors to fill data gaps.

1. Organizing the collection of raw values

This sub section focuses on the collection of raw values of social indicators. A screening of impacts in the life cycle can be useful to orient data collection. In this case study, a screening is first carried by looking at the most intensive activities in the supply chain (i.e. the PSILCA sectors that are inputs in the foreground model and that show higher market prices). These findings need to be combined to sector literature review. This allows to prioritize data collection.

The most intensive activities over the life cycle are the inputs from Cotton textile-IN and Shipping-DE. The indicators set to “High risk” and “Very high risk” are identified from the Social aspects tab of the relevant sectors in openLCA. For instance, based on the Figure 4, the indicators *Children in employment, male*, *Trade union density* and *Weekly hours per employees* can be spotted for the sector Cotton textiles-IN. The indicators *Social security expenditures*, *Extraction of biomass* and *Public sector corruption* are also spotted, as well as almost every indicator contributing to the categories *Safe and healthy living condition*, *Health and safety*, and *Contribution to economic development*.

Name	Raw value	Risk level	Activity variable	Data quality
<ul style="list-style-type: none"> ▼ Workers > Discrimination > Fair Salary ▼ Child labour 👤 Children in employment, male 👤 Children in employment, female 👤 Children in employment, total > Health and Safety ▼ Freedom of association and collective bargaining 👤 Trade union density 👤 Right of Association 👤 Right to Strike 👤 Right of Collective bargaining ▼ Working time 👤 Weekly hours of work per employee 				
👤 Children in employment, male	82.6 [% of male children a...	Very high risk	0.193436640511462 [h, wo...	(1;2;4;1;5)
👤 Children in employment, female	1.6 [% of female children ...	Very low risk	0.193436640511462 [h, wo...	(1;1;4;1;5)
👤 Children in employment, total	1.7 [% of all children ages ...	Very low risk	0.193436640511462 [h, wo...	(1;2;4;2;5)
👤 Trade union density	19.57 [%]	Very high risk	0.193436640511462 [h, wo...	(1;1;2;3;5)
👤 Right of Association	3 [4 point scale]	No risk	0.193436640511462 [h, wo...	(1;1;3;1;5)
👤 Right to Strike	2 [4 point scale]	Low risk	0.193436640511462 [h, wo...	(1;1;3;1;1)
👤 Right of Collective bargaining	3 [4 point scale]	No risk	0.193436640511462 [h, wo...	(1;1;3;1;1)
👤 Weekly hours of work per employee	22.1 [h]	High risk	0.193436640511462 [h, wo...	(1;2;1;3;3)

Figure 4: Social indicators extracted from the Social aspects tab of the PSILCA sector Cotton textiles-IN

For the shipping sector in Germany, the following social indicators showed high potential risks: *Living wage*, *Gender wage gap*, *Presence of sufficient safety measures*, *Trade union density*, *Extraction of biomass*, *Level of industrial water (related to renewable resources)*, *Certified environmental management systems*, *International migrant stock*, *Immigration rate*, and *Embodied CO2 footprint*.

Country-level raw values were retrieved from global databases such as The World Bank Data, the OECD database, the Global Peace Index, ILAB, the Global Slavery Index, and ILOSTAT. Sector-related data for manufacturing were collected from a Fair Wear Foundation (FWF) report (India Country Study, 2019), and an International Labour Organization (ILO) case study about the garment sector in India (Insights into working conditions in India's garment industry, 2015). Remaining data gaps were filled with data from proxy sectors, chosen accordingly to the NACE documentation: Cotton textiles-IN for Manufacturing, Wholesale trade-DE for D&R, Other services-DE for laundry services (Use Scenario 2), and Services for private households-DE for housekeeper services (Use Scenario 3).

No primary data was found for the End-of-Life stage. It was thus modelled with the input commodity Waste disposal and sewerage service-DE which contains generic indicators for this sector.

- *Prioritizing data collection.* As the inventory part can quickly become overwhelming, it is necessary to prioritize where to investigate. A first screening of the potential impacts can be made with a hotspot analysis of involved PSILCA sectors. Key social issues spotted in the literature, as well as the most active or intensive activities in term of activity variable, can also help to guide the research.
- *Finding data.* Site-specific data collection should be prioritized if possible. If not, or in order to cross check the primary data, open source database provided by the following organizations can be investigated: Fair Wage Database, OECD, ILO, and World Bank Group. Input-Output databases such as EORA and EXIOBASE can also contain data fitting to the scope of the study.
- *Limits of the activity variable modelling.* The activity variable logic not necessarily reflects the importance of the impact, as a small input can be part of a wider social issue. Moreover, qualitative data, or quantitative data that do not fit any of the existing indicators, cannot be implemented. This information should be stated in the report and used for the interpretation even though it is not included in the calculated impacts.
- *Dealing with unpaid services.* Such services are not included in the worker hours, albeit a potentially significant issue. This can for instance contribute to forced labor, as there can be constraints to work for free, using blackmail or other kind of pressure. Therefore, the integration of unpaid services is possible but very specific to each case.

2. Evaluating the risk of social indicators

The raw value of each indicator found is attributed to a corresponding risk evaluation. For this study only already existing indicators from PSILCA were used. The risk levels are defined for the selected social indicators according to the descriptions of indicators provided in the PSILCA documentation (Maister, Noi, Ciroth, & Srocka, 2020). For instance, the FWF (2019) mentioned previously reports that the trade union density in the garment manufactures in India is inferior to 5%. According to the risk levels for this social indicator, illustrated in Figure 5, the indicator *Trade union density* is attributed to “Very high risk” for the process Manufacturing. Likewise, the raw values collected previously are attributed to a risk level and implemented in the social outputs of each process.

Indicator value y , %	Risk level
$20 \geq y$	very high risk
$20 < y \leq 40$	high risk
$40 < y \leq 60$	medium risk
$60 < y \leq 80$	low risk
$80 < y$	very low risk

Figure 5: Risk levels of the social indicator *Trade union density*, as defined in the PSILCA documentation

The risk levels are already defined for proxy data from a representative sector. The social outputs are added to the process identically to the PSILCA sectors selected previously. Figure 6 illustrates some social outputs of the sector Wholesaletrade-DE, which is the proxy sector chosen for D&R.

As these social indicators are missing in the primary data collection they are added to the D&R process, with worker hours adapted to this case study (see 3. Defining the activity variable).

Flow	Category	Amount	Unit
Active involvement of enterprises in corruption and bribery; low risk	Value Chain Actors/Corruption	0.00891	h
Certified environmental management systems; high risk	Local Community/Access to material resources	0.00891	h
Children in employment, female; low risk	Workers/Child labour	0.00891	h

Figure 6: Partial list of outputs of the sector Wholesale trade-DE from the PSILCA database

It is assumed that there is no risk for the users to wear or wash the sweater. Assuming that a hazardous chemical in the composition would have impacts on the consumer’s health, a new indicator could be created in PSILCA as the current version does not include the stakeholder consumer. Moreover, as stated previously, the process End-of-Life does not have social outputs due to lack of data.

- *Understanding the risk levels of existing indicators.* Most of the indicators include a description and an evaluation schema. In case of doubt, or if some information is missing, the documentation of the PSILCA database gives a comprehensive description of every indicator along with an explanation of the risk scale associated.
- *Creating new indicators.* It can be relevant to create a new indicator specific to the study. The *Guidelines for Social Life Cycle Assessment of Products and Organizations* (Life Cycle Initiative, 2020) give recommendations for the creation of reference scales in the *Impact Assessment* section of the document.

3. Defining the activity variable

The activity variable used for this case is worker hours, defined by the following formula:

$$\text{Worker hours} = \frac{\text{Unit labour costs}}{\text{Mean hourly labour cost (per employee)}} * \text{Price of product}$$

Worker hours per \$ output

Workers hours are expressed in h, unit labour costs in USD/USD, mean hourly labour cost in USD/h and the price of the product in USD. More details can be found about the different terms of the formula in the PSILCA manual (Maister, Noi, Ciroth, & Srocka, 2020) and the S-LCA Guidelines (Life Cycle Initiative, 2020).

As no site-specific data were available for this case study, the worker hours were approximated with values from the literature. Regarding manufacturing, unit labour costs are estimated to be 3% of the intermediate product market price (Clean Clothes Campaign, 2022). The mean hourly labour cost was estimated from the average wage of workers in the garment sector in India (International Labour Organization, 2015). The worker hours of this process thus follow the formula:

$$\begin{aligned}
 \text{Worker hours}_{\text{Manufacturing}} &= \text{Unit labour costs} / \text{Mean hourly labour cost} * \text{Price} \\
 &= \text{Unit labour costs} * (\text{Weekly hours} * \text{Number of weeks per month} / \\
 &\quad \text{Average wage of workers}) * \text{Price} \\
 &= 0.03 * (49.8 \text{ h} * 4.5 / 65.76 \text{ USD } 2015) * 6.1013 \text{ USD } 2015 \\
 &= 0.6238 \text{ h}
 \end{aligned}$$

For the other processes, worker hours were calculated from the Worker hours per dollar of output of representative PSILCA sectors defined previously. For instance, the worker hours for Distribution and retail were calculated as described in the following formula:

$$\begin{aligned}
 \text{Worker hours}_{\text{D\&R}} &= \text{Worker hours per \$ output}_{\text{Wholesaletrade-DE}} * \text{Market price}_{\text{Distributed_HS}} \\
 &= 0.00891 \text{ h/USD } 2015 * 30.72 \text{ USD } 2015 \\
 &= 0.2737 \text{ h}
 \end{aligned}$$

- *Defining the Unit labour costs and Meanly hour wage.* These values are generally given by the companies involved directly. If not, they have to be looked for in the literature.
- *Using Worker hours per dollar of output.* The PSILCA Database provides the worker hours associated to the activity of a given sector, in the *Amount* column of outputs. Processes are generally calibrated on one dollar of activity. The worker hours can be obtained by multiplying this result by the market price of the quantitative reference (in \$2015).

III. Life Cycle Impact assessment and Interpretation

The entire life cycle of the sweater is calculated in OpenLCA using the Social Impacts Weighting Method available in PSILCA.

Hotspot analysis

Table 1: Impact results for one cotton hooded sweater of 750g, for one year, in the case of an internal use

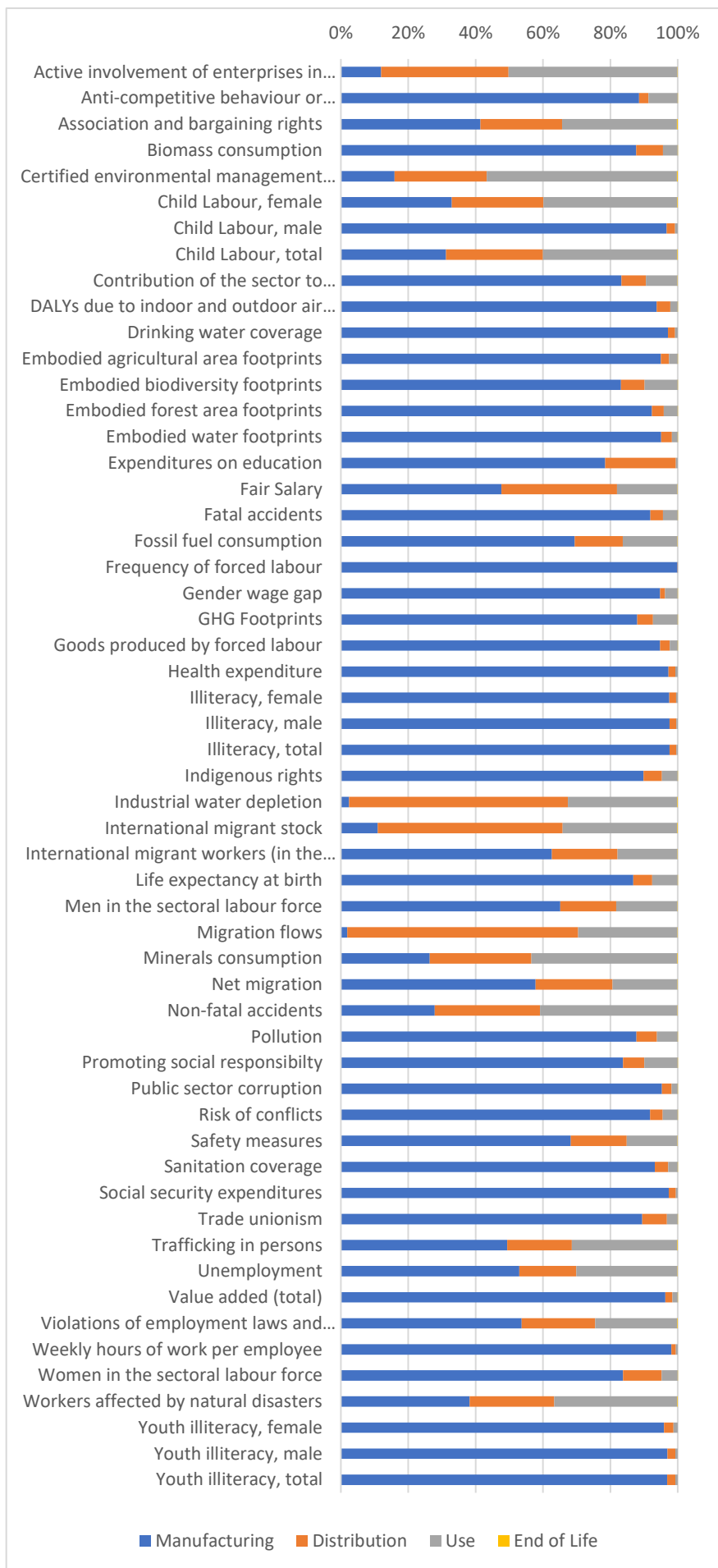
Name	Impact assessment result	Unit
Active involvement of enterprises in corruption and bribery	7.31051	AI med risk hours
Anti-competitive behaviour or violation of anti-trust and monopoly legislation	29.71216	AC med risk hours
Association and bargaining rights	9.15707	ACB med risk hours
Biomass consumption	587.69117	BM med risk hours
Certified environmental management system	6.75771	CMS med risk hours
Child Labour, female	3.25884	CL med risk hours
Child Labour, male	463.59903	CL med risk hours
Child Labour, total	2.54899	CL med risk hours
Contribution of the sector to economic development	10.11386	CE med risk hours
DALYs due to indoor and outdoor air and water pollution	5.53732	DALY med risk hours
Drinking water coverage	525.47546	DW med risk hours
Embodied agricultural area footprints	0.50229	EAF med risk hours
Embodied biodiversity footprints	2.31943	EBF med risk hours
Embodied forest area footprints	0.2711	EFA med risk hours
Embodied water footprints	2.19908	EFW med risk hours
Expenditures on education	13.70427	EE med risk hours
Fair Salary	278.53791	FS med risk hours
Fatal accidents	0.49448	FA med risk hours
Fossil fuel consumption	0.09175	FF med risk hours
Frequency of forced labour	62.86115	FL med risk hours
Gender wage gap	66.72681	GW med risk hours
GHG Footprints	24.97052	GHGF med risk hours
Goods produced by forced labour	2.294	GFL med risk hours
Health expenditure	261.83303	HE med risk hours
Illiteracy, female	523.42325	I med risk hours
Illiteracy, male	522.4058	I med risk hours
Illiteracy, total	522.51906	I med risk hours
Indigenous rights	6.43059	IR med risk hours
Industrial water depletion	46.77229	WU med risk hours
International migrant stock	6.49353	IMS med risk hours
International migrant workers (in the sector/ site)	1.24952	IMW med risk hours
Life expectancy at birth	6.19282	LE med risk hours
Men in the sectoral labour force	0.081	M med risk hours
Migration flows	86.86577	MF med risk hours
Minerals consumption	3.09747	MC med risk hours
Net migration	0.10019	NM med risk hours
Non-fatal accidents	2.31341	NFA med risk hours
Pollution	61.30889	P med risk hours
Promoting social responsibility	83.24297	PSR med risk hours
Public sector corruption	539.5785	C med risk hours
Risk of conflicts	56.16373	ROC med risk hours

Safety measures	6.3122	SM med risk hours
Sanitation coverage	55.61668	SC med risk hours
Social security expenditures	524.56599	SS med risk hours
Trade unionism	572.03049	TU med risk hours
Trafficking in persons	15.80413	TP med risk hours
Unemployment	1.13392	U med risk hours
Value added (total)	329.90235	VAT med risk hours
Violations of employment laws and regulations	16.00174	VL med risk hours
Weekly hours of work per employee	109.25678	WH med risk hours
Women in the sectoral labour force	20.12978	W med risk hours
Workers affected by natural disasters	2.38181	ND med risk hours
Youth illiteracy, female	53.33254	YI med risk hours
Youth illiteracy, male	52.72115	YI med risk hours
Youth illiteracy, total	52.74783	YI med risk hours

Some additional information regarding the manufacturing stage could not be included in the quantitative assessment. For example, the loud ambient noise in the garment manufactures and the risks of building collapsing are not included in the model. At the scale of the worker, poor ergonomic conditions can result in musculoskeletal disorders (fibres2Fabric). Moreover, pressure to do overtime, bad treatments such as beating and harassment including sexual harassment towards women were declared by workers in surveys carried by ILO (International Labour Organization, 2015). These additional risks could potentially increase the impact in categories such as Violations of employment laws and regulations, Frequency of force labour (considering that overtime is done under pressure and/or blackmail from the manager), DALYs due to indoor and outdoor air, Non-fatal accidents, or Safety measures.

Figure 4 illustrates the contribution of life cycle stages to the overall results. The impacts are mainly divided between Manufacturing, D&R and the use phase. The end of life has few inputs, which is the reason why it contributes so little to the impacts. The impacts from Manufacturing predominate for most categories regarding the stakeholder Society. It can be explained by high illiteracy rates in India as well as low public expenditures on education and health. Likewise, the position in India in the Global Peace Index (Institute for Economics and Peace, 2022) results in this stage representing more than 90% of the category *Risk of conflicts*. Manufacturing also weighs a lot in the impact categories regarding the stakeholder Workers. Indeed, the social expenditures of the Indian government are very low and forced labour has been reported in the India garment sector, backed up by the list of goods produced by child of forced labour (ILAB, 2022). The high share in the indicator *Weekly hours of work* is due to systematic overtime in the cotton textile factories. The most contributing process of Manufacturing is Cotton textiles-IN. A large part of the impacts of this sector comes from the sector Manufacture of leather and leather products-IN, one of the most important inputs of Cotton textile-IN in terms of amounts. The direct impacts of Manufacturing share a significant part of the burdens as well.

Figure 7:
Contribution of life
cycle stages over
the whole life cycle
of the sweater



Finally, the input “Copper ore” punctually shares a significant part of the impacts, for the categories *Violation of employment laws and regulations* and *Goods produced by forced labour* for instance.

D&R contributes to the total impacts as well. The direct impacts of this process influence the category *Expenditures on education* due to the low budget for education in Germany (4.9 % of GDP in 2018 according to the World Bank database). They also contribute significantly to the impact categories *Fair Salary*, *Industrial water depletion*, *International Migrant Stock* and *Migration flows*. Apart from these categories, most of the impacts of this stage do not come from the direct impacts but from the input “Shipping”.

The contribution of the use stage to the impacts are only due to the supply chain, as the base case does not include any social outputs. The sector Electricity and district heat-DE is responsible for most of the impacts of this stage, due to the electricity consumption of the washing machine. Manufacture of chemical products-DE is the second most contributing input, due to the use of non-ionic surfactant.

A more detailed analysis and interpretation is given to the impact categories *Fair salary*, *Gender wage gap*, *Trade unionism* and *Value-added* hereafter. These categories were selected based on the primary data available and the potential risks screened in the literature. Although all life cycle stages are considered, End of life does not appear in the process contribution graphs due to rounding, as its contribution does not exceed 0.2% of the total impacts.

Fair salary

This impact category takes into account the subindicators *Living wage, per month*, *Minimum wage, per month* and *Sector average wage, per month*. In the PSILCA documentation (2020), fair salary corresponds to “a wage fairly and reasonably commensurate with the value of a particular service or class of service rendered, and, in establishing a minimum fair wage for such service or class of service”.

The contribution of processes to this category is illustrated Figure 5. Almost half of the impacts comes from the garment manufactures. This is due to the low wages reported in this sector, notably as they are lower than the living wage. Some regions in India have a legal minimum wage, such as Maharashtra, which is lower than the living wage lower bond reported by FWF. Moreover, some regions do not have a legal minimum wage, such as Odisha which is one of the regions producing a large part of Indian cotton garments. The direct impacts of the D&R stage represent a significant part of the total impacts as well, despite reasonably high salaries when comparing to the living wage. The risk comes from the living wage in itself which is rather high. It is also the case of the sector of electricity in the use stage, which shares the same social aspects as it is based in Germany.

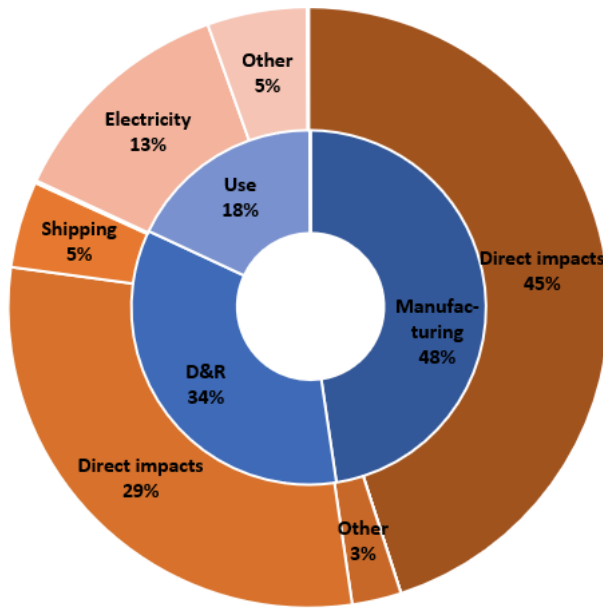


Figure 8: Process contribution to the impact category Fair salary

Gender wage gap

This impact category follows the definition of gender wage gap as the “difference between median earnings of men and women relative to median earnings of men, referring to full-time employees” (2020).

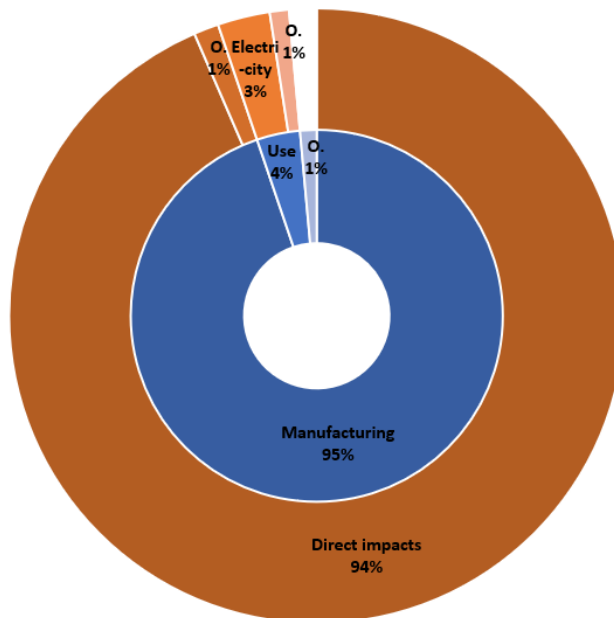


Figure 9: Process contribution to the impact category Gender wage gap. O.=Other

The contribution of processes to this category is illustrated Figure 6. Almost all impacts come from the garment manufacturing site. Indeed, FWF reports a very high gender gap (39%). Inequalities in the access to education and the workplace results in the segregation of women to unskilled activities such as basic agriculture, elementary services and handicraft

manufacturing according to the same report. Moreover, managerial positions are predominantly given to men, which explains the high gender wage gap in the garment sector.

Trade unionism

This impact category represents the indicator *Trade union density*. The latter assesses how liberal and vivid trade union culture is, and to what degree the right to organize freely is assured in different sectors (2020).

The contribution of processes to this category is illustrated Figure 7. There is a very low trade union density in Indian garment manufactures (less than 5%) which explains its high contribution to the issue. This density is higher for Cotton textiles-IN and Manufacturing of metal products-IN (19.57% for both), as well as for D&R in Germany (19.3%), compared to garment manufactures. All these sectors are evaluated as “Very high risk” as their raw value is below 20% (see Figure 5). Therefore, their characterisation factor only depends on the working hours associated, which explain the predominance of Cotton textiles-IN over Manufacturing of metal products-IN and the direct impact of Manufacturing. More than half of the impacts of Cotton textiles-IN comes from sector of leather products, which is a significant input in terms of value, followed by the direct impacts of the sector itself.

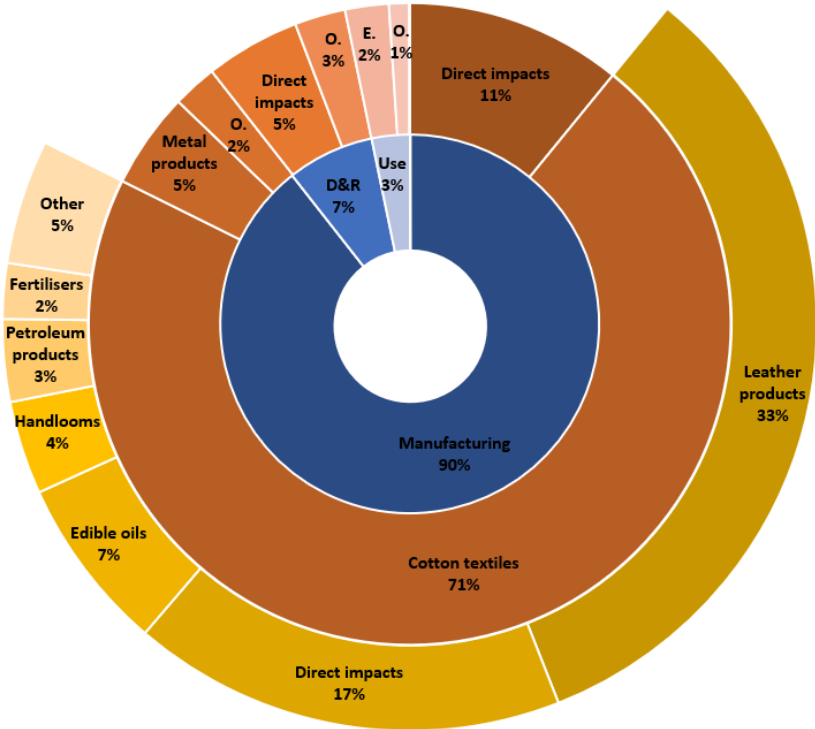


Figure 10: Process contribution to the impact category Trade unionism. O.=Other, E.=Electricity

Value added

This impact category represents the indicator *Embodied value-added total*. It reflects the average value of the difference between the sale price and the production cost in relation to 1 dollar of the output product within various sectors.

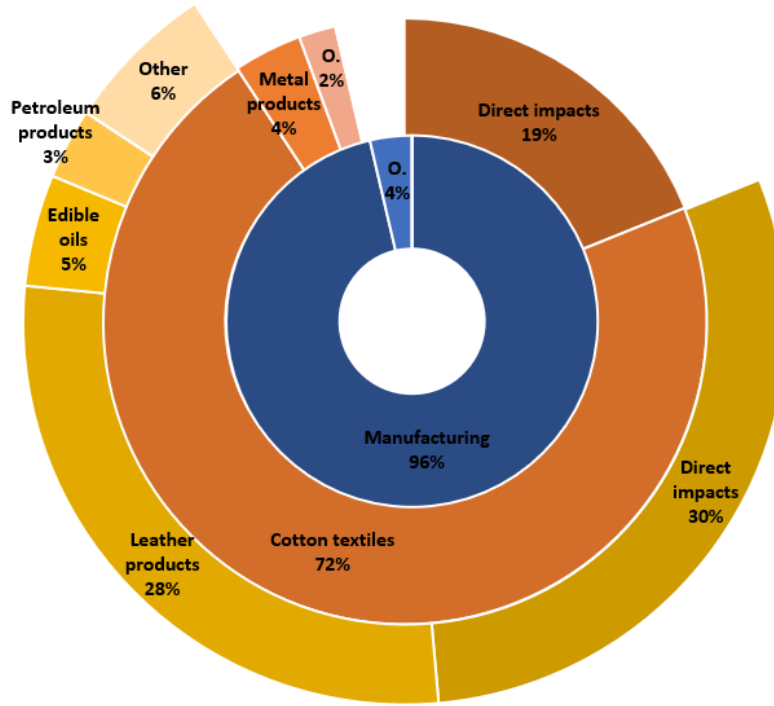


Figure 11: Process contribution to the impact category Value added. O.=Other

The contribution of processes to this category is illustrated in the Figure 11. The value added is very low in India in the sectors of production of cotton, cotton textiles and cotton garments. It notably explains the attractive price for European retailers. This low added value is partly made possible by the low labour costs, that reflect on the low wage of the workers.

Scenarios of use

Two scenarios were assessed regarding the use of the sweater: the washing by a laundry as a service, and the washing at home by a housekeeper. The results are reported Table 2. The detailed relative results are reported in the annex C.

Table 2: Impact results of the life cycle of the hooded sweater for three scenarios of use: internal, laundry and housekeeper

Name	Internal	Laundry	Housekeeper	Unit
Active involvement of enterprises in...	7.31051	8.42558	7.33993	AI med risk hours
Anti-competitive behaviour or violation of...	29.71216	30.65464	30.00635	AC med risk hours
Association and bargaining rights	9.15707	9.66468	9.15707	ACB med risk hours
Biomass consumption	587.6912	728.1069	882.17765	BM med risk hours
Certified environmental management system	6.75771	21.16409	36.17693	CMS med risk hours
Child Labour, female	3.25884	3.68725	3.55304	CL med risk hours

Child Labour, male	463.599	465.579	466.541	CL med risk hours
Child Labour, total	2.54899	2.91439	2.84318	CL med risk hours
Contribution of the sector to...	10.11386	23.76494	39.53309	CE med risk hours
DALYs due to indoor and outdoor air...	5.53732	5.57558	5.56674	DALY med risk hours
Drinking water coverage	525.4755	526.2501	525.5049	DW med risk hours
Embodied agricultural area footprints	0.50229	0.50475	0.50229	EAF med risk hours
Embodied biodiversity footprints	2.31943	2.38766	2.34884	EBF med risk hours
Embodied forest area footprints	0.2711	0.27343	0.2711	EFA med risk hours
Embodied water footprints	2.19908	2.21914	2.49327	EFW med risk hours
Expenditures on education	13.70427	27.1697	43.1235	EE med risk hours
Fair Salary	278.5379	695.8627	1455.336	FS med risk hours
Fatal accidents	0.49448	0.51382	0.5239	FA med risk hours
Fossil fuel consumption	0.09175	0.10838	0.12117	FF med risk hours
Frequency of forced labour	62.86115	62.87688	62.89057	FL med risk hours
Gender wage gap	66.72681	80.82953	96.14604	GW med risk hours
GHG Footprints	24.97052	28.12671	30.85437	GHGF med risk hours
Goods produced by forced labour	2.294	2.43899	2.58819	GFL med risk hours
Health expenditure	261.833	262.5769	262.745	HE med risk hours
Illiteracy, female	523.4233	523.8	523.4527	I med risk hours
Illiteracy, male	522.4058	522.7093	522.4352	I med risk hours
Illiteracy, total	522.5191	522.83	522.5485	I med risk hours
Indigenous rights	6.43059	6.62132	6.72478	IR med risk hours
Industrial water depletion	46.77229	185.2308	341.2588	WU med risk hours
International migrant stock	6.49353	20.46438	35.91276	IMS med risk hours
International migrant workers	1.24952	1.42937	1.54371	IMW med risk hours
Life expectancy at birth	6.19282	6.30917	6.19282	LE med risk hours
Men in the sectoral labour force	0.081	1.42941	3.02292	M med risk hours
Migration flows	86.86577	376.3023	704.6696	MF med risk hours
Minerals consumption	3.09747	3.51155	3.42108	MC med risk hours
Net migration	0.10019	0.11726	0.1296	NM med risk hours
Non-fatal accidents	2.31341	2.39138	2.34283	NFA med risk hours
Pollution	61.30889	62.14218	61.60308	P med risk hours
Promoting social responsibilty	83.24297	86.36269	112.6622	PSR med risk hours
Public sector corruption	539.5785	541.5949	539.8727	C med risk hours
Risk of conflicts	56.16373	56.77482	56.19315	ROC med risk hours
Safety measures	6.3122	6.51678	6.6064	SM med risk hours
Sanitation coverage	55.61668	56.06475	55.91087	SC med risk hours
Social security expenditures	524.566	525.1148	524.8602	SS med risk hours
Trade unionism	572.0305	710.8979	866.2228	TU med risk hours
Trafficking in persons	15.80413	16.98285	16.09832	TP med risk hours
Unemployment	1.13392	1.35789	1.42811	U med risk hours
Value added (total)	329.9024	330.928	329.9318	VAT med risk hours
Violations of employment laws...	16.00174	30.28419	19.23786	VL med risk hours
Weekly hours of work per employee	109.2568	110.7212	112.1987	WH med risk hours
Women in the sectoral labour force	20.12978	20.35731	20.1592	W med risk hours
Workers affected by natural disasters	2.38181	2.57998	2.41123	ND med risk hours
Youth illiteracy, female	53.33254	53.49169	53.36195	YI med risk hours
Youth illiteracy, male	52.72115	52.79636	52.75057	YI med risk hours
Youth illiteracy, total	52.74783	52.824	52.77725	YI med risk hours

The two alternative scenarios show higher impacts than the original one in all impact categories, since they include additional social outputs in the use stage. The impacts are particularly higher in categories for which the use stage was already contributing significantly in the base case, such as *Fair Salary*, *Industrial water depletion*, *International migrant stock*, *Migration flows* and *Minerals consumption*. Between the two scenarios, Housekeeper performs worse than Laundry for these categories. Indeed, the worker hours of Housekeeper are over twice as much as for the Laundry scenario, which results in a higher characterisation factor, and therefore higher impact results. The base case is the scenario with the lowest social impacts overall.

IV. Conclusions and recommendations

Most impacts of the sweater come from the manufacturing stage, although the distribution and the use stage share a significant portion of the burdens for some impact categories. The end of life has negligible impacts on the whole life of the sweater. Within Manufacturing, the social potential impacts mostly come from the cotton textiles sector and from the direct impacts of garment manufactures. Both sectors show hotspots regarding wage, trade union culture, and value added. The gender gap is particularly significant in Indian garment manufactures. For distribution and retailing, most of the impacts are direct ones, notably due to the high living wage in Germany. For the use stage, most of the impacts come from the electricity consumption of the washing machine.

The Use stage alternative scenarios perform worse for all impact categories. The housekeeper scenario shows the most significant increase of impacts.

New indicators could be developed to include sector-specific issues in a more comprehensive manner. Moreover, additional research could be done to evaluate the impacts of the product during the use phase. Despite these limitations, this study provides good insights about the social hotspots of the life cycle of the hooded sweater.

The main recommendations for the German retailers are to choose a manufacturer which performs socially responsibly in terms of working conditions, particularly regarding weekly hours, overtime hours, trade union density, and sector wage. The main recommendation for the user is to wash the sweater himself or herself.

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Annex A: Impact categories of the Social Impacts Weighting Method

Table 3: Name and unit of the impact categories covered by the Social impacts weighting method

Name	Reference unit
Active involvement of enterprises in corruption and bribery	AI med risk hours
Anti-competitive behaviour or violation of anti-trust and monopoly legislation	AC med risk hours
Association and bargaining rights	ACB med risk hours
Biomass consumption	BM med risk hours
Certified environmental management system	CMS med risk hours
Child Labour, female	CL med risk hours
Child Labour, male	CL med risk hours
Child Labour, total	CL med risk hours
Contribution of the sector to economic development	CE med risk hours
DALYs due to indoor and outdoor air and water pollution	DALY med risk hours
Drinking water coverage	DW med risk hours
Embodied agricultural area footprints	EAF med risk hours
Embodied biodiversity footprints	EBF med risk hours
Embodied forest area footprints	EFA med risk hours
Embodied water footprints	EWF med risk hours
Expenditures on education	EE med risk hours
Fair Salary	FS med risk hours
Fatal accidents	FA med risk hours
Fossil fuel consumption	FF med risk hours
Frequency of forced labour	FL med risk hours
Gender wage gap	GW med risk hours
GHG Footprints	GHGF med risk hours
Goods produced by forced labour	GFL med risk hours
Health expenditure	HE med risk hours
Illiteracy, female	I med risk hours
Illiteracy, male	I med risk hours
Illiteracy, total	I med risk hours
Indigenous rights	IR med risk hours
Industrial water depletion	WU med risk hours
International migrant stock	IMS med risk hours
International migrant workers (in the sector/ site)	IMW med risk hours
Life expectancy at birth	LE med risk hours
Men in the sectoral labour force	M med risk hours
Migration flows	MF med risk hours
Minerals consumption	MC med risk hours
Net migration	NM med risk hours
Non-fatal accidents	NFA med risk hours
Pollution	P med risk hours
Promoting social responsibility	PSR med risk hours
Public sector corruption	C med risk hours
Risk of conflicts	ROC med risk hours

Safety measures	SM med risk hours
Sanitation coverage	SC med risk hours
Social security expenditures	SS med risk hours
Trade unionism	TU med risk hours
Trafficking in persons	TP med risk hours
Unemployment	U med risk hours
Value added (total)	VAT med risk hours
Violations of employment laws and regulations	VL med risk hours
Weekly hours of work per employee	WH med risk hours
Women in the sectoral labour force	W med risk hours
Workers affected by natural disasters	ND med risk hours
Youth illiteracy, female	YI med risk hours
Youth illiteracy, male	YI med risk hours
Youth illiteracy, total	YI med risk hours

Annex B: Life cycle Inventory

Table 4: LCI of the manufacturing stage (inputs)

Item	Country	PSILCA sector	Amount	Unit	Market price	Unit	Source	Output price (USD 2022)	Output price (USD 2015)
Brass	India	Copper ore	0.02	kg	580	Rs/kg	https://dir.indiamart.com/impcat/brass-alloy.html	0.1392	0.1114
Metal working	India	Manufacture of metal products n.e.c. and n.s.	1	item	60	Rs/zipper	https://dir.indiamart.com/search.mp?ss=brass+zippers&stype=attr=1	0.7200	0.5760
Polyester resin	India	Manufacture of plastic products	0.02	kg	120	Rs/kg	https://dir.indiamart.com/search.mp?ss=polyester+resin&mcatid=5369&catid=111&prdsrsrc=1&src=as-popular%3Akwd%3Dpolyester%3Apos%3D6%3Acat%3D-2%3Amdcat%3D-2	0.0288	0.0230
Transport, lorry	India	Other transport	0.04	t.km	3.6	Rs/tkm	https://www.statista.com/statistics/1248959/india-per-metric-ton-kilometer-cost-of-different-modes-of-logistics/	0.0017	0.0014
Textile, knit cotton	India	Cotton textiles	0.79	kg	670	Rs/kg	https://dir.indiamart.com	6.3516	5.0813
Electricity	India	Electricity	0.686667	kWh	6.15	Rs/kWh	https://www.statista.com/statistics/808201/india-cost-of-state-electricity-supply/	0.0507	0.0405
Waste textile	India	Other transport	0.08	kg	1000	Rs/t	https://royalsocietypublishing.org/doi/10.1098/rsos.160764	0.0010	0.0008
Manufactured HS	India		1	item	7.626667	USD/item	Almanza et al. 2020	7.6267	6.101333333

Table 5: LCI of manufacturing (output: collected data)

Item	Country	Data source	Raw value	Unit	Risk level	Labour cost	Mean hourly wage	Worker hours (h)
Gender wage gap	India	Fair wair foundation 2019	39	%	Very high risk	0.03	0.293440428	0.623772263
Minimum wage per month	India	Simpliance 2022	84.7488	USD	Very high risk	0.03	0.293440428	0.623772263
Living wage upper bound	India	Fair wair foundation 2019	311.808	USD	Very low	0.03	0.293440428	0.623772263
Living wage average	India	Fair wair foundation 2019	252.88	USD	Medium risk	0.03	0.293440428	0.623772263
Living wage lower bound	India	Fair wair foundation 2019	193.952	USD	Low risk	0.03	0.293440428	0.623772263
Sector average wage	India	ILO 2015	65.76	USD	Very high risk	0.03	0.293440428	0.623772263
Children in employment, male	India	World Bank 2012	1.9	%	Very low risk	0.03	0.293440428	0.623772263
Children in employment, female	India	World Bank 2012	1.6	%	Very low risk	0.03	0.293440428	0.623772263
Children inemployment, total	India	World Bank 2012	1.7	%	Very low risk	0.03	0.293440428	0.623772263
Trade union density	India	Fair wair foundation 2019	<5	%	Very high risk	0.03	0.293440428	0.623772263
Weekly hours of work per employee	India	ILO 2019	49.8	h	Low risk	0.03	0.293440428	0.623772263
Weekly hours of work with overtime	India	Fair wair foundation 2019	70-100	h	Very high risk	0.03	0.293440428	0.623772263
Frequency of forced labour	India	Global Slavery Index 2018	6.1	1/1000	Very high risk	0.03	0.293440428	0.623772263
Embodied value added total	India	World Bank 2018	0.09	\$/ \$	Very high risk	0.03	0.293440428	0.623772263
Health expenditure, public	India	World Bank 2019	32.79	% of tot expenditure	High risk	0.03	0.293440428	0.623772263
Health expenditure, external	India	World Bank 2019	0.83	% of tot expenditure	Very low risk	0.03	0.293440428	0.623772263
Domestic (private) health expenditure	India	World Bank 2019	66.38	% of tot expenditure	Sub indicator	0.03	0.293440428	0.623772263
Health expenditure, out-of-pocket	India	World Bank 2019	54.78	% of tot expenditure	Very high risk	0.03	0.293440428	0.623772263
Health expenditure, total	India	World Bank 2019	3.01	% of GDP	High risk	0.03	0.293440428	0.623772263
Life expectancy at birth	India	World Bank 2020	70	years	medium risk	0.03	0.293440428	0.623772263
Global peace index	India	Global peace index 2022	2.578	ratio	High risk	0.03	0.293440428	0.623772263
Goods produced by forced labour	India	ILAB 2022	5-6	#	High risk	0.03	0.293440428	0.623772263
Public expenditure to education	India	World Bank 2020	3.36	% of GDP	High risk	0.03	0.293440428	0.623772263

Table 6: LCI of manufacturing (output: proxy from PSILCA sector Cotton Textiles- IN)

Item	Country	Raw value	Unit	Risk level	Labour cost	Mean hourly wage	Worker hours (h)
Illiteracy rate, female	India	36.78	%	Very high risk	0.03	0.293440428	0.623772263
Illiteracy rate, male	India	20.08	%	Very high risk	0.03	0.293440428	0.623772263
Illiteracy rate total	India	28.23	% tot pop	Very high risk	0.03	0.293440428	0.623772263
Youth illiteracy, female	India	0.17	%	High risk	0.03	0.293440428	0.623772263
Youth illiteracy, male	India	9.3	%	High risk	0.03	0.293440428	0.623772263
Youth illiteracy rate, total	India	11.39	% of pop aged 15-24	High risk	0.03	0.293440428	0.623772263
Women in the sectoral labour force	India	1.12	ratio	Very low risk	0.03	0.293440428	0.623772263
Men in the sectoral labour force	India	0.96	ratio	Very low risk	0.03	0.293440428	0.623772263
DALYs due to indoor and outdoor air and water pollution	India	23.2	DALY rate	Medium risk	0.03	0.293440428	0.623772263
Violations of mandatory health and safety standards	India	5.40E-07	ratio	Low risk	0.03	0.293440428	0.623772263
Workers affected by natural disasters	India	2.02	%	Low risk	0.03	0.293440428	0.623772263
Right of Association	India	3	4 point scale	No risk	0.03	0.293440428	0.623772263
Right of Collective bargaining	India	3	4 point scale	No risk	0.03	0.293440428	0.623772263
Right to Strike	India	2	4 point scale	Low risk	0.03	0.293440428	0.623772263
Trafficking in persons	India	2	Tier	Medium risk	0.03	0.293440428	0.623772263
Evidence of violations of laws and employment regulations	India	2.28	Cases per 10000 employees	Medium risk	0.03	0.293440428	0.623772263
Social security expenditures	India	1.2	% of GDP	Very high risk	0.03	0.293440428	0.623772263
Certified environmental management systems	India	0.14	#	Very low risk	0.03	0.293440428	0.623772263
Extraction of biomass (related to area)	India	852.23	annual t/km2	Very high risk	0.03	0.293440428	0.623772263
Extraction of biomass (related to population)	India	2.06	annual t/cap	Very low risk	0.03	0.293440428	0.623772263
Extraction of fossil fuels	India	0.57	annual t/cap	Very low risk	0.03	0.293440428	0.623772263
Extraction of industrial and construction minerals	India	2.29	annual t/cap	Very low risk	0.03	0.293440428	0.623772263
Extraction of ores	India	0.14	annual t/cap	Very low risk	0.03	0.293440428	0.623772263
Level of industrial water use (related to renewable water resources)	India	0.52	% of total actual renewable water	Very low risk	0.03	0.293440428	0.623772263
Level of industrial water use (related to total withdrawal)	India	2.23	% of total water withdrawal	Very low risk	0.03	0.293440428	0.623772263
Drinking water coverage	India	49.4	%	Very high risk	0.03	0.293440428	0.623772263
Sanitation coverage	India	35.9	%	High risk	0.03	0.293440428	0.623772263
Pollution level of the country	India	75.81	Pollution index	High risk	0.03	0.293440428	0.623772263
Embodied water footprint	India	3.79E-07	Mm3/\$	Very low risk	0.03	0.293440428	0.623772263
Presence of indigenous population	India	1	Y/N	Medium risk	0.03	0.293440428	0.623772263
Indigenous People Rights Protection Index	India	4	6 point scale	Low risk	0.03	0.293440428	0.623772263
International Migrant Stock	India	0.39	%	Very low risk	0.03	0.293440428	0.623772263
Public sector corruption	India	60	Index score	Very high risk	0.03	0.293440428	0.623772263
Presence of anti-competitive behaviour or violation of anti-trust and monopoly legislation	India	0.07	Cases per 10000 employees	Low risk	0.03	0.293440428	0.623772263
Contribution of the sector to the economy	India	16.24	%	Medium opportunity	0.03	0.293440428	0.623772263

Table 7: LCI of the distribution and retail stage (inputs)

Item	Country	PSILCA sector	Amount	Unit	Market price	Unit	Source	Output price (USD 2022)	Output price (USD)
Packaging	India	Manufacture of plastic products	0.1	kg	140	IR/kg	https://dir.indiamart.com/search.mp?ss=plastic+packaging+materials&stype=attr=1	0.1680	0.1344
Road transport Odisha-Chennai	India	Other transport	1.216	tkm	3.6	IR/tkm	https://www.statista.com/statistics/1248959/india-per-metric-ton-kilometer-cost-of-different-modes-of-logistics/	0.0525	0.0420
Parcel India-Germany	Germany	Shipping	0.76	kg	336	IR/kg	https://www.activexinternationalcourier.com/courier-charges/chennai-to-germany.html	3.0643	2.4515
Plastic waste	Germany	Waste disposal and sewerage services	0.1	kg	94	EUR/ton	https://www.actu-environnement.com/ae/news/couts-gestion-dechets-menagers-fnade-amorce-16953.php4#:~:text=Par%20type%20de%20traitement%2C%20les,%C3%A0%20251%20%E2%82%AC%2Ft	0.0090	0.0113
Ditributed HS	Germany		1	item	40	EUR/item	https://www.lotuscrafts.eu/products/organic-mens-hooded-sweatshirt?variant=39437175750754?variant=39437175750754&trc_gcmp_id=17538712939&trc_gag_id=&trc_gad_id=&utm_source=google&utm_medium=paid&utm_campaign=17538712939&utm_content=&utm_term=&gadid=&gclid=EAlaIQobChMItbG6t4y6-glVWEaRBR34wwJ_EAQYASABEgl2NfD_BwE	38.4	30.72

Table 8: LCI of distribution and retail (output: collected data)

Item	Country	Data source	Raw value	Unit	Risk level	Worker hours (h)
Health expenditure, public	Germany	World Bank 2019	77.73	% of tot exp	Low risk	0.2737152
Health expenditure, external	Germany	World Bank 2019	0	% of tot exp	Very low risk	0.2737152
Domestic (private) health expenditure	Germany	World Bank 2019	22.27	% of tot exp	Sub indicator	0.2737152
Health expenditure, out-of-pocket	Germany	World Bank 2019	12.82	% tot exp	Low risk	0.2737152
Health expenditure, total	Germany	World Bank 2019	11.7	% of GDP	Low risk	0.2737152
Life expectancy at birth	Germany	World Bank 2020	81	years	no risk	0.2737152
Global peace index	Germany	Global peace index 2022	1.462	ratio	Very low risk	0.2737152
Public expenditure to education	Germany	World Bank 2020	4.7	% of GDP	High risk	0.2737152
Gender wage gap	Germany	ILO 2020	20%		Medium risk	0.2737152
Sector average wage	Germany	ILO 2020	4241.712	USD	Very low risk	0.2737152
Trade union density	Germany	OECD 2019	19.3	%	Very high risk	0.2737152

Table 9: LCI of distribution and retail (output: proxy from PSILCA sector Wholesale trade-DE)

Item	Country	Raw value	Unit	Risk level	Worker hours (h)
Living wage per month	Germany	2018.18	USD	Very high risk	0.2737152
Weekly hours per employee	Germany	36.64	h	Medium risk	0.2737152
Minimum wage per month	Germany	1799.55	USD	Very low risk	0.2737152
Illiteracy rate, female	Germany	0.86	%	Very low risk	0.2737152
Illiteracy rate, male	Germany	0.54	%	Very low risk	0.2737152
Illiteracy rate total	Germany	0.7	%	Very low risk	0.2737152
Youth illiteracy, female	Germany	0.17	%	Very low risk	0.2737152
Youth illiteracy, male	Germany	0.26	%	Very low risk	0.2737152
Youth illiteracy rate, total	Germany	0.25	%	Very low risk	0.2737152
Women in the sectoral labour force	Germany	1.09	ratio	Very low risk	0.2737152
Men in the sectoral labour force	Germany	0.91	ratio	Very low risk	0.2737152
DALYs due to indoor and outdoor air and water pollution	Germany	0.76	DALY rate	Very low risk	0.2737152
Presence of sufficient safety measures	Germany	0.0221	Cases per	High risk	0.2737152
Rate of fatal accidents at workplace	Germany	0.63	# /yr	Very low risk	0.2737152
Rate of non-fatal accidents at workplace	Germany	1814.8	# /yr	Medium risk	0.2737152
Violations of mandatory health and safety standards	Germany	7.60E-07	ratio	Low risk	0.2737152

Workers affected by natural disasters	Germany	0.0079	%	Very low risk	0.273715
Right of Association	Germany	3	4 point scale	No risk	0.273715
Right of Collective bargaining	Germany	3	4 point scale	No risk	0.273715
Right to Strike	Germany	3	4 point scale	No risk	0.273715
Trafficking in persons	Germany	1	Tier	Low risk	0.273715
Frequency of forced labour	Germany	2	%o	Very low risk	0.273715
Evidence of violations of laws and employment	Germany	1.71	Cases per 10000 employees	Medium risk	0.273715
Social security expenditures	Germany	18.57	% of GDP	Low risk	0.273715
Certified environmental management systems	Germany	0.00140749	#	High risk	0.273715
Extraction of biomass (related to area)	Germany	646.75	annual t/km2	Very high risk	0.273715
Extraction of biomass (related to population)	Germany	2.85	annual t/cap	Low risk	0.273715
Extraction of fossil fuels	Germany	2.43	annual t/cap	Very low risk	0.273715
Extraction of industrial and construction minerals	Germany	6.62	annual t/cap	Low risk	0.273715
Extraction of ores	Germany	0.01	annual t/cap	Very low risk	0.273715
Level of industrial water use (related to renewable water resources)	Germany	17.55	% of total actual renewable water	Very high risk	0.273715
Level of industrial water use (related to total)	Germany	19.94	% of total water withdrawal	Low risk	0.273715
Drinking water coverage	Germany	99.2	%	Very low risk	0.273715
Sanitation coverage	Germany	95.4	%	Low risk	0.273715
Embodied water footprint	Germany	6.60E-08	Mm3/\$	Very low risk	0.273715
International Migrant Stock	Germany	14.87	%	High risk	0.273715
Public sector corruption	Germany	19	Index score	Low risk	0.273715
Contribution of the sector to the economy	Germany	11.34	%	Medium opportunity	0.273715
Net migration rate	Germany	1.5	%o	Very low risk	0.273715
Emigration rate	Germany	0.01	ratio	Very high risk	0.273715
Number of asylum seekers	Germany	0.0024	ratio	Very high risk	0.273715
Immigration rate	Germany	0.02	ratio	High risk	0.273715
Unemployment rate in the country	Germany	3.8	%	Low risk	0.273715
Number of threatened species	Germany	2.80E-07	#	Very low risk	0.273715
Embodied value added total	Germany	0.59079	\$/ \$	Low risk	0.273715
Active involvement of enterprises in corruption	Germany	4	%	Low risk	0.273715

Table 10: LCI of the use stage, Scenario 1 Internal use (inputs)

Item	Country	PSILCA sector	Amount	Unit	Market price	Unit	Source	Output price (EUR)	Output price (USD)
Electricity	Germany	Electricity and district heat	0.32	kWh	0.47	Eur/kWh	https://www.statista.com/statistics/1267541/germany-monthly-wholesale-electricity-price/	0.1504	0.1155
Non ionic surfactant	Germany	Manufacture of chemical products	0.01	kg	2.62	eur/kg	REWE	0.0262	0.0201
Tap water	Germany	Water supply	13	kg	1.81258	EUR/m3	https://www.bwb.de/content/en/html/1720.php	0.0236	0.0181
Wastewater	Germany	Waste disposal and sewerage services	13	L	2.21	EUR/m3	https://www.bwb.de/content/en/html/1720.php	0.0287	0.0221
Washed clothes	Germany		1	kg	4	EUR/Cycle of 6 kg	Lavomatic Berlin	0.666666667	0.5120

Table 11: LCI of the use stage, Scenario 2 Laundry (inputs)

Item	Country	PSILCA sector	Amount	Unit	Market price	Unit	Source	Output price (EUR)	Output price (USD)
Electricity	Germany	Electricity and district heat	0.79	kWh	0.2664	Eur/kWh	https://www.statista.com/statistics/1050448/industrial-electricity-prices-including-tax-germany/#:~:text=Industrial%20electricity%20prices%20including%20tax%20in%20Germany%201998%2D2022&text=Industrial%20electricity%20prices%20including%20electricity,cents%20was%20reached%20since%201998	0.2105	0.1616
Non ionic surfactant	Germany	Manufacture of chemical products	0.016667	L	1.18	EURO/L	https://www.metro.de/marktplatz/product/0ded1c0d-3b42-452e-8bd3-57b1b0f62160?mfeed_oid=c9db3947-2d08-4465-95d6-67ee8579ebbe&gclid=EA1aIQobChMI58Cy7OHp-gIVU49oCR3UbwynEAQYBiABEgKB-fD_BwE&itm_pm=cookie_consent_accept_button	0.0197	0.0151
Tap water	Germany	Water supply	13	kg	1.81258	EUR/m3	https://www.bwb.de/content/en/html/1720.php	0.0236	0.0181
Wastewater	Germany	Waste disposal and sewerage services	13	L	2.21	EUR/m3	https://www.bwb.de/content/en/html/1720.php	0.0287	0.0221
Washed clothes	Germany		1	kg	6	EUR/sweater	https://hublo.eu/prix-tarif-pressing/#:~:text=De%203%2C5%E2%82%AC%20%C3%A0,un%20pull%20ou%20un%20pantalonhttps://hublo.eu/prix-tarif-pressing/#:~:text=De%203%2C5%E2%82%AC%20%C3%A0,un%20pull%20ou%20un%20pantalon	8	6.144

Table 12: LCI of the use stage, Scenario 2 Laundry (outputs: collected data)

Item	Country	Data source	Raw value	Unit	Risk level	Worker hours (h)
Health expenditure, public	Germany	World Bank 2019	77.73	% of tot exp	Low risk	0.021842104
Health expenditure, external	Germany	World Bank 2019	0	% of tot exp	Very low risk	0.021842104
Health expenditure, out-of-pocket	Germany	World Bank 2019	12.82	% tot exp	Low risk	0.021842104
Health expenditure, total	Germany	World Bank 2019	11.7	% of GDP	Low risk	0.021842104
Life expectancy at birth	Germany	World Bank 2020	81	years	no risk	0.021842104
Global peace index	Germany	Global peace index 2022	1.462	ratio	Very low risk	0.021842104
Public expenditure to education	Germany	World Bank 2020	4.7	% of GDP	High risk	0.021842104
Trade union density	Germany	OECD 2019	19.3	%	Very high risk	0.021842104
Average wage of the sector	Germany	https://www.erieri.com/salary/job/dry-cleaner/germany/berlin	2473.92768	USD	Medium risk	0.021842104

Table 13: LCI of the use stage, Scenario 2 Laundry (outputs: proxy from PSILCA sector Other service activities- DE)

Item	Country	Raw value	Unit	Risk level	Worker hours (h)
Weekly hours per week	Germany	53.2	h	Medium risk	0.021842104
Living wage per month	Germany	2018.18	USD	Very high risk	0.021842104
Minimum wage per month	Germany	1799.55	USD	Very low risk	0.021842104
Illiteracy rate, female	Germany	0.86	%	Very low risk	0.021842104
Illiteracy rate, male	Germany	0.54	%	Very low risk	0.021842104
Illiteracy rate total	Germany	0.7	%	Very low risk	0.021842104
Youth illiteracy, female	Germany	0.17	%	Very low risk	0.021842104
Youth illiteracy, male	Germany	0.26	%	Very low risk	0.021842104
Youth illiteracy rate, total	Germany	0.25	%	Very low risk	0.021842104
Women in the sectoral labour force	Germany	1.49	ratio	Very low risk	0.021842104
Gender gape wage	Germany	20.87	%	High risk	0.021842104
Men in the sectoral labour force	Germany	0.57	ratio	Medium risk	0.021842104
DALYs due to indoor and outdoor air and water pollution	Germany	0.76	DALY rate	Very low risk	0.021842104
Presence of sufficient safety measures	Germany	0.0019	Cases per 10000 employees	Very low risk	0.021842104
Rate of fatal accidents at workplace	Germany	2.53	# /yr	Very low risk	0.021842104
Rate of non-fatal accidents at workplace	Germany	588.66	# /yr	Very low risk	0.021842104
Violations of mandatory health and safety standards	Germany	7.60E-07	ratio	Low risk	0.021842104

Workers affected by natural disasters	Germany	0.0079	%	Very low risk	0.021842
Right of Association	Germany	3	4 point scale	No risk	0.021842
Right of Collective bargaining	Germany	3	4 point scale	No risk	0.021842
Right to Strike	Germany	3	4 point scale	No risk	0.021842
Trafficking in persons	Germany	1	Tier	Low risk	0.021842
Frequency of forced labour	Germany	2	%o	Very low risk	0.021842
Evidence of violations of laws and employment regulations	Germany	20.91	Cases per 10000 employees	High risk	0.021842
Social security expenditures	Germany	18.57	% of GDP	Low risk	0.021842
Certified environmental management systems	Germany	0.001407	#	High risk	0.021842
Extraction of biomass (related to area)	Germany	646.75	annual t/km2	Very high risk	0.021842
Extraction of biomass (related to population)	Germany	2.85	annual t/cap	Low risk	0.021842
Extraction of fossil fuels	Germany	2.43	annual t/cap	Very low risk	0.021842
Extraction of industrial and construction minerals	Germany	6.62	annual t/cap	Low risk	0.021842
Extraction of ores	Germany	0.01	annual t/cap	Very low risk	0.021842
Level of industrial water use (related to renewable water resources)	Germany	17.55	% of total actual renewable water	Very high risk	0.021842
Level of industrial water use (related to total withdrawal)	Germany	19.94	% of total water withdrawal	Low risk	0.021842
Drinking water coverage	Germany	99.2	%	Very low risk	0.021842
Sanitation coverage	Germany	95.4	%	Low risk	0.021842
Embodied water footprint	Germany	6.60E-08	Mm3/\$	Very low risk	0.021842
International Migrant Stock	Germany	14.87	%	High risk	0.021842
Public sector corruption	Germany	19	Index score	Low risk	0.021842
Contribution of the sector to the economy	Germany	48.29	%	High opportunity	0.021842
Net migration rate	Germany	1.5	%o	Very low risk	0.021842
Emigration rate	Germany	0.01	ratio	Very high risk	0.021842
Number of asylum seekers	Germany	0.0024	ratio	Very high risk	0.021842
Immigration rate	Germany	0.02	ratio	High risk	0.021842
Unemployment rate in the country	Germany	3.8	%	Low risk	0.021842
Number of threatened species	Germany	2.80E-07	#	Very low risk	0.021842
Embodied value added total	Germany	0.703	\$/	Very low risk	0.021842
Active involvement of enterprises in corruption	Germany	1	%	Very low risk	0.021842
Membership in an initiative that promotes SCR	Germany	10	Number of companies	Medium risk	0.021842

Table 14: Table 6: LCI of the use stage, Scenario 3 Housekeeper (inputs)

Item	Country	PSILCA sector	Amount	Unit	Market price	Unit	Source	Output price (EUR)	Output price (USD)
Electricity	Germany	Electricity and district heat	0.32	kWh	0.47	Eur/kWh	https://www.statista.com/statistics/1267541/germany-monthly-wholesale-electricity-price/	0.1504	0.1155
Non ionic surfactant	Germany	Manufacture of chemical products	0.01	kg	2.62	eur/kg	REWE	0.0262	0.0201
Tap water	Germany	Water supply	13	kg	1.81258	EUR/m3	https://www.bwb.de/content/en/html/1720.php	0.0236	0.0181
Wastewater	Germany	Waste disposal and sewerage services	13	L	2.21	EUR/m3	https://www.bwb.de/content/en/html/1720.php	0.0287	0.0221
Washed clothes	Germany		1	kg	10.65	EUR/h worked	https://www.payscale.com/research/DE/Job=Cleaner/Hourly_Rate	2.441666667	1.8752

Table 15: LCI of the use stage, Scenario 3 Housekeeper (outputs: collected data)

Item	Country	Data source	Raw value	Unit	Risk level	Worker hours (h)
Health expenditure, public	Germany	World Bank 2019	77.73	% of tot exp	Low risk	0.047774816
Health expenditure, external	Germany	World Bank 2019	0	% of tot exp	Very low risk	0.047774816
Health expenditure, out-of-pocket	Germany	World Bank 2019	12.82	% tot exp	Low risk	0.047774816
Health expenditure, total	Germany	World Bank 2019	11.7	% of GDP	Low risk	0.047774816
Life expectancy at birth	Germany	World Bank 2020	81	years	no risk	0.047774816
Global peace index	Germany	Global peace index 2022	1.462	ratio	Very low risk	0.047774816
Public expenditure to education	Germany	World Bank 2020	4.7	% of GDP	High risk	0.047774816
Trade union density	Germany	OECD 2019	19.3	%	Very high risk	0.047774816
Average wage of the sector	Germany	https://www.glassdoor.de/Salaries/germany-housekeeper-salary-SRCH_IL.0,7_IN96_KO8,19.htm?countryRedirect=true#:~:text=The%20estimated%20total%20pay%20for,of%20%E2%82%AC1%2C806%20per%20month	1774.862069	USD	Very high risk	0.047774816

Table 16: LCI of the use stage, Scenario 2 Laundry (outputs: proxy from PSILCA sector Services for private households-DE)

Item	Country	Raw value	Unit	Risk level	Worker hours (h)
Weekly hours per week	Germany	53.2	h	Medium risk	0.047774816
Living wage per month	Germany	2018.18	USD	Very high risk	0.047774816
Minimum wage per month	Germany	1799.55	USD	Very low risk	0.047774816
Illiteracy rate, female	Germany	0.86	%	Very low risk	0.047774816
Illiteracy rate, male	Germany	0.54	%	Very low risk	0.047774816
Illiteracy rate total	Germany	0.7	%	Very low risk	0.047774816
Youth illiteracy, female	Germany	0.17	%	Very low risk	0.047774816
Youth illiteracy, male	Germany	0.26	%	Very low risk	0.047774816
Youth illiteracy rate, total	Germany	0.25	%	Very low risk	0.047774816
Women in the sectoral labour force	Germany	1.49	ratio	Very low risk	0.047774816
Gender gape wage	Germany	20.87	%	High risk	0.047774816
Men in the sectoral labour force	Germany	0.57	ratio	Medium risk	0.047774816
DALYs due to indoor and outdoor air and water pollution	Germany	0.76	DALY rate	Very low risk	0.047774816
Presence of sufficient safety measures	Germany	0.0019	Cases per 10000 employees	Very low risk	0.047774816
Rate of fatal accidents at workplace	Germany	2.53	# /yr	Very low risk	0.047774816
Rate of non-fatal accidents at workplace	Germany	588.66	# /yr	Very low risk	0.047774816
Violations of mandatory health and safety standards	Germany	7.60E-07	ratio	Low risk	0.047774816
Workers affected by natural disasters	Germany	0.0079	%	Very low risk	0.047774816

Workers affected by natural disasters	Germany	0.0079	%	Very low risk	0.047775
Right of Association	Germany	3	4 point scale	No risk	0.047775
Right of Collective bargaining	Germany	3	4 point scale	No risk	0.047775
Right to Strike	Germany	3	4 point scale	No risk	0.047775
Trafficking in persons	Germany	1	Tier	Low risk	0.047775
Frequency of forced labour	Germany	2	%o	Very low risk	0.047775
Evidence of violations of laws and employment regulations	Germany	4.24	Cases per 10000 employees	Medium risk	0.047775
Social security expenditures	Germany	18.57	% of GDP	Low risk	0.047775
Certified environmental management systems	Germany	0.00395756	#	High risk	0.047775
Extraction of biomass (related to area)	Germany	646.75	annual t/km2	Very high risk	0.047775
Extraction of biomass (related to population)	Germany	2.85	annual t/cap	Low risk	0.047775
Extraction of fossil fuels	Germany	2.43	annual t/cap	Very low risk	0.047775
Extraction of industrial and construction minerals	Germany	6.62	annual t/cap	Low risk	0.047775
Extraction of ores	Germany	0.01	annual t/cap	Very low risk	0.047775
Level of industrial water use (related to renewable water resources)	Germany	17.55	% of total actual renewable water	Very high risk	0.047775
Level of industrial water use (related to total withdrawal)	Germany	19.94	% of total water withdrawal	Low risk	0.047775
Drinking water coverage	Germany	99.2	%	Very low risk	0.047775
Sanitation coverage	Germany	95.4	%	Low risk	0.047775
Embodied water footprint	Germany	1.83E-06	Mm3/\$	Low risk	0.047775
International Migrant Stock	Germany	14.87	%	High risk	0.047775
Public sector corruption	Germany	19	Index score	Low risk	0.047775
Contribution of the sector to the economy	Germany	48.29	%	High opportunity	0.047775
Net migration rate	Germany	1.5	%o	Very low risk	0.047775
Emigration rate	Germany	0.01	ratio	Very high risk	0.047775
Number of asylum seekers	Germany	0.0024	ratio	Very high risk	0.047775
Immigration rate	Germany	0.02	ratio	High risk	0.047775
Unemployment rate in the country	Germany	3.8	%	Low risk	0.047775
Number of threatened species	Germany	2.80E-07	#	Very low risk	0.047775
Embodied value added total	Germany	0.9974	\$/ \$	Very low risk	0.047775
Membership in an initiative that promotes SCR	Germany	2	Number of companies	High risk	0.047775
Active involvement of enterprises in corruption	Germany	1	%	Very low risk	0.047775

Table 17: LCI of End of life stage (inputs)

Input/Output	Item	Country	Corresponding PSILCA sector	Amount	Unit	Market price	Unit	Source	Output price (USD)	Output price (USD)
Input	Municipal waste	Germany	Waste disposal and sewerage services	0.75	kg	94	EUR/ton	https://www.actu-environnement.com/ae/news/couts-gestion-dechets-menagers-fnade-amorce-16953.php4#:~:text=Par%20type%20de%20traitement%2C%20les,%C3%A0%20251%20%E2%82%AC%2Ft	0.06768	0.054144
Quantitative ref.	Disposed HS	Germany		1	item					

Table 18: LCI Life cycle

Input/Output	Item	Amount	Unit
Input	Disposed sweater		1 item
Input	Distributed sweater		1 item
Input	Manufactured sweater		1 item
Input	Used sweater	$0.75 * \text{laundry} * 52 * 6 / 3.8$	kg
Input	Used sweater	$0.75 * \text{housekeeper} * 52 * 6 / 3.8$	kg
Input	Used sweater	$0.75 * \text{internal} * 52 * 6 / 3.8$	kg
Quantitative ref.	Entire cycle sweater		1 item

Annex C: Relative results

Name	Internal	Laundry	Housekeeper	Unit	Internal	Laundry	Housekeeper
Active involvement of enterprises in corruption and bribery	7.31051	8.42558	7.33993	AI med risk hours	100%	115%	100%
Anti-competitive behaviour or violation of anti-trust and monopoly legislation	29.71216	30.65464	30.00635	AC med risk hours	100%	103%	101%
Association and bargaining rights	9.15707	9.66468	9.15707	ACB med risk hours	100%	106%	100%
Biomass consumption	587.6912	728.1069	882.17765	BM med risk hours	100%	124%	150%
Certified environmental management system	6.75771	21.16409	36.17693	CMS med risk hours	100%	313%	535%
Child Labour, female	3.25884	3.68725	3.55304	CL med risk hours	100%	113%	109%
Child Labour, male	463.599	465.579	466.54095	CL med risk hours	100%	100%	101%
Child Labour, total	2.54899	2.91439	2.84318	CL med risk hours	100%	114%	112%
Contribution of the sector to economic development	10.11386	23.76494	39.53309	CE med risk hours	100%	235%	391%
DALYs due to indoor and outdoor air and water pollution	5.53732	5.57558	5.56674	DALY med risk hours	100%	101%	101%
Drinking water coverage	525.4755	526.2501	525.50488	DW med risk hours	100%	100%	100%
Embodied agricultural area footprints	0.50229	0.50475	0.50229	EAF med risk hours	100%	100%	100%
Embodied biodiversity footprints	2.31943	2.38766	2.34884	EBF med risk hours	100%	103%	101%
Embodied forest area footprints	0.2711	0.27343	0.2711	EFA med risk hours	100%	101%	100%
Embodied water footprints	2.19908	2.21914	2.49327	EFW med risk hours	100%	101%	113%
Expenditures on education	13.70427	27.1697	43.1235	EE med risk hours	100%	198%	315%
Fair Salary	278.5379	695.8627	1455.33649	FS med risk hours	100%	250%	522%
Fatal accidents	0.49448	0.51382	0.5239	FA med risk hours	100%	104%	106%
Fossil fuel consumption	0.09175	0.10838	0.12117	FF med risk hours	100%	118%	132%
Frequency of forced labour	62.86115	62.87688	62.89057	FL med risk hours	100%	100%	100%
Gender wage gap	66.72681	80.82953	96.14604	GW med risk hours	100%	121%	144%
GHG Footprints	24.97052	28.12671	30.85437	GHGF med risk hours	100%	113%	124%
Goods produced by forced labour	2.294	2.43899	2.58819	GFL med risk hours	100%	106%	113%
Health expenditure	261.833	262.5769	262.74502	HE med risk hours	100%	100%	100%
Illiteracy, female	523.4233	523.8	523.45267	I med risk hours	100%	100%	100%
Illiteracy, male	522.4058	522.7093	522.43522	I med risk hours	100%	100%	100%
Illiteracy, total	522.5191	522.83	522.54848	I med risk hours	100%	100%	100%

Indigenous rights	6.43059	6.62132	6.72478	IR med risk hours	100%	103%	105%
Industrial water depletion	46.77229	185.23083	341.25877	WU med risk hours	100%	396%	730%
International migrant stock	6.49353	20.46438	35.91276	IMS med risk hours	100%	315%	553%
International migrant workers (in the sector/ site)	1.24952	1.42937	1.54371	IMW med risk hours	100%	114%	124%
Life expectancy at birth	6.19282	6.30917	6.19282	LE med risk hours	100%	102%	100%
Men in the sectoral labour force	0.081	1.42941	3.02292	M med risk hours	100%	1765%	3732%
Migration flows	86.86577	376.30232	704.66957	MF med risk hours	100%	433%	811%
Minerals consumption	3.09747	3.51155	3.42108	MC med risk hours	100%	113%	110%
Net migration	0.10019	0.11726	0.1296	NM med risk hours	100%	117%	129%
Non-fatal accidents	2.31341	2.39138	2.34283	NFA med risk hours	100%	103%	101%
Pollution	61.30889	62.14218	61.60308	P med risk hours	100%	101%	100%
Promoting social responsibility	83.24297	86.36269	112.6622	PSR med risk hours	100%	104%	135%
Public sector corruption	539.5785	541.59491	539.87269	C med risk hours	100%	100%	100%
Risk of conflicts	56.16373	56.77482	56.19315	ROC med risk hours	100%	101%	100%
Safety measures	6.3122	6.51678	6.6064	SM med risk hours	100%	103%	105%
Sanitation coverage	55.61668	56.06475	55.91087	SC med risk hours	100%	101%	101%
Social security expenditures	524.56599	525.11476	524.86019	SS med risk hours	100%	100%	100%
Trade unionism	572.03049	710.89792	866.22277	TU med risk hours	100%	124%	151%
Trafficking in persons	15.80413	16.98285	16.09832	TP med risk hours	100%	107%	102%
Unemployment	1.13392	1.35789	1.42811	U med risk hours	100%	120%	126%
Value added (total)	329.90235	330.92804	329.93177	VAT med risk hours	100%	100%	100%
Violations of employment laws and regulations	16.00174	30.28419	19.23786	VL med risk hours	100%	189%	120%
Weekly hours of work per employee	109.25678	110.72115	112.19871	WH med risk hours	100%	101%	103%
Women in the sectoral labour force	20.12978	20.35731	20.1592	W med risk hours	100%	101%	100%
Workers affected by natural disasters	2.38181	2.57998	2.41123	ND med risk hours	100%	108%	101%
Youth illiteracy, female	53.33254	53.49169	53.36195	YI med risk hours	100%	100%	100%
Youth illiteracy, male	52.72115	52.79636	52.75057	YI med risk hours	100%	100%	100%
Youth illiteracy, total	52.74783	52.824	52.77725	YI med risk hours	100%	100%	100%