



# Social Life Cycle Assessment of Denim Fabric Produced from Turkish Organic Cotton

Master's thesis in Industrial Ecology

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Cover:

The pictures on the front cover are taken by the authors of this report on their field study in Turkey March-April 2022. They show cotton bales (left) and cotton fibers ready for spinning (right), respectively.

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## Abstract

The global textile industry is infamous for contributing to environmental and social impacts. The former includes the release of textile processing chemicals and pesticides, while the latter includes harsh working conditions and child labour. Therefore, further improvements in the sustainability of textile products from a life cycle perspective are warranted. This report presents a social life cycle assessment (SLCA), based on the United Nations Environment Programme's (UNEP) "Guidelines for Social Life Cycle Assessment of Products" from 2021.

The study aims to identify the risks for potential social impacts connected to the life cycle of denim fabric. This SLCA is a cradle-to-gate study that considers the organic cotton cultivation and fabric production from an existing value chain located mainly in Turkey. The data was collected by interviews on-site during a field study. Additional data was obtained from social audit reports as well as governmental and non-governmental organisations.

The Reference Scale Approach was used in the impact assessment to identify risks for potential social impacts. The stakeholder groups included in the scope were primarily workers. However, risks for potential social impacts related to the local community and value chain actors were also considered.

The results for the whole product system show no risks for potential social impacts, meaning that no incidents had occurred. The calculated score indicated an existing management system in place by the organisations involved in the study. For the subcategory Child Labour, no extensive engagement could be identified, therefore it received the lowest score (+1) in the product system. The subcategory Fair salary received the highest score since several organisations responsible for the activities engaged in the social issue more broadly than the other subcategories. For the cotton cultivation activity, the harvesting required the most worker hours, with the subcategories Working hours, Employment relationship and Safe and healthy living conditions showing the highest risk of potential social impacts. For fabric production, Fair salary, Working hours, and Health and safety had the highest risk of potential social impacts.

The sensitivity analysis shows that the result depends heavily on the choice of data source. Therefore, recommendations for future studies suggest including more data on the specific value chain to increase the reliability of the results. Finally, it is recommended to adjust the reference scales to not give an advantage to big companies over small companies for reaching the higher scores due to the more extensive resources of big companies. Therefore, future recommendations regarding the SLCA methodology are to consider different reference scales.

Keywords: LCA, denim production, cotton, reference scale approach, jeans, social assessment.



## Social Life Cycle Assessment of Denim Fabric produced from Turkish Organic Cotton

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## Sammanfattning

Textilindustrin är ökänd för att bidra till negativa miljö- och sociala effekter. De förstnämnda inkluderar utsläpp av textilbearbetningskemikalier och bekämpningsmedel, medan de senare inkluderar svåra arbetsförhållanden och barnarbete. Ytterligare förbättringar av textila produkters hållbarhet i ett livscykelperspektiv är därför motiverade. Denna rapport innehåller en social livscykelanalys (SLCA) baserad på FN:s miljöprogram (UNEP) "Guidelines for Social Life Cycle Assessment of Products" från 2021.

Syftet med studien är att identifiera risker för potentiell social påverkan kopplade till livscykeln av jeansstyg. Denna SLCA är en studie från vagga till port bestående av bomullsodlingar och tygproduktion av jeansstyg från en befintlig produktkedja huvudsakligen i Turkiet. Data samlades in genom intervjuer under en fältstudie. Ytterligare data hämtas från sociala revisionsrapporter samt statliga och icke-statliga organisationer.

Referensskalemetoden användes i påverkansbedömningen för att identifiera risk för potentiell social påverkan. De intressentgrupper som ingår i studien är främst arbetare, men också lokalsamhället och värdekedjans aktörer.

Resultaten för hela produktionskedjan visar inga risker för potentiell social påverkan, vilket innebär att inga incidenter hade inträffat. De framräknade poängen visade även att det finns befintliga hanterings- och säkerhetssystem på plats hos de organisationer som är involverade i studien. För underkategorin Barnarbete kunde inget omfattande engagemang identifieras och den fick därför lägst poäng (+1). Högst poäng fick underkategorin Skälig lön då flera organisationer arbetade med denna underkategori i större utsträckning än övriga underkategorier. För bomullsodlingen krävde skördens flest arbetstimmar, och underkategorierna Arbetstid, Anställningsförhållande samt Säkra och hälsosamma levnadsförhållanden fick störst risk för potentiell social påverkan. För tygproduktion hade Skälig lön, Arbetstid samt Hälsa och säkerhet den högsta risken för potentiell social påverkan.

Känslighetsanalysen visar att resultaten är kraftigt beroende av val av datakälla. Därför är rekommendationen för framtida studier att inkludera mer data specifikt kopplat till produktkedjan för att öka resultatens tillförlitlighet. Avslutningsvis rekommenderas att justera referensskalan för att undvika att ge stora företag fördelar jämfört med små företag när det kommer till att nå de högre poängen på grund av de större företagens resurser. Således är en framtida rekommendation gällande SLCA-metoden att överväga andra referensskalar.



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Ida Aguilar Johansson and Malin Björkner, Gothenburg, June 2022



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# 1

# Introduction

As one of the primary industry sectors in the world, the textile and clothing industry employs millions of workers around the globe. Therefore, the sector offers great potential to contribute to economic and social development by increasing exports and employment (International Labour Organisation, n.d.). The textile and clothing industry depends on agricultural practices to provide input of raw materials. An example of such is the most common and historically known raw material fibre, cotton. However, necessary ecological factors, such as suitable weather conditions and good soil quality, limit the cotton fields to the countries that satisfy the required conditions.

Of the 1 billion people that in 2013 was involved in agricultural practices around the world, roughly 400 million were waged (International Labour Organisation, 2014). In developing countries, prevalent social issues include the unrecognised role of women in agriculture, inadequate skills, exclusion of agricultural workers from national labour laws, low wages, dangerous working conditions, and a high incidence of child and forced labour (International Labour Organisation, n.d.).

In general, textile companies use overseas production as an established strategy to decrease labour and manufacturing costs. International Labour Organisation (ILO) describes the textile sector as having high volatility, low predictability, low-profit margins, labour-intensive production, and rapid market-driven changes that all are influencing the workers working conditions. Several reports on social tragedies coupled with the textile industry have gained attention, for example, the Rana Plaza collapse in 2013, where the collapse of an eight-store factory building for textiles caused the lives of 1129 people (International Labour Office, 2018).

The United Nations Environment Programme (UNEP) (2021) presents a method for companies working with products and want to evaluate the social dimension of sustainability. That method is called social life cycle assessment (SLCA), which considers the risks of potential social impacts connected to a value chain of a product or service. SLCA considers the whole value chain, from raw material extraction to final disposal (UNEP, 2021).

This study aims to identify risks for potential social impacts in one of the company Nudie Jeans' value chains using the method SLCA. Nudie Jeans is a global company with retailers in over 50 countries worldwide. It was founded in 2001 with headquarters in Gothenburg, Sweden. Identifying the risks of potential social impacts connected to the production of their products is of interest due to the high transparency the company is determined to maintain for their customers, but also crucial for maintaining good relations between the actors in the value chain. Nudie Jeans has previously used monitoring tools to assess social sustainability, such as documentation of independent social audits performed at their cotton fields as well as fabric supplier. However, according to new textile industry requirements, in the Sustainable Apparel Coalition, a

social assessment needs to be conducted for a company to denote itself “socially sustainable” (Sustainable Apparel Coalition, n.d.).

### 1.1 Goal

The study aims to identify risks for potential social impacts in the activities in the life cycle of denim fabric by using the SLCA method. The activities include organic cotton cultivation and fabric production in Turkey. The intended outcome of the study is to present the results in a hotspot analysis. The primary target audience is the stakeholders and organisations involved in the product value chain. In addition, researchers and practitioners in the SLCA community might benefit from the methodological learnings of the study.

The main research question is: What are the risks for potential social impacts associated with the value chain of denim fabric from an organic cotton plantation in Turkey?

### 1.2 Limitations

The focus of this study is on the two activities cotton cultivation and fabric production. Consequently, the assessment considers a cradle-to-gate system of the production of the denim fabric, excluding the fabric’s use phase and end of life. Risks for potential social impacts connected to the transportation of raw materials and products are excluded from the assessment. In general, it is important to state that SLCA is a novel methodology under continuous development. In addition, since the data gathering was largely performed in Turkey, language barriers can have affected the outcome.

# 2

# Background

The background section contains general information of relevance for the study, such as information on denim fabric production and the country-specific context.

## 2.1 Corporate Social Responsibility

Increasingly, the expectations from the consumers are for companies to make responsible business decisions for the people, planet, and products (Hutchins, 2018). Companies are thus held accountable for any social impact caused by their suppliers. Corporate Social Responsibility (CSR) is used at companies' organisational level as a self-regulatory mechanism to handle social issues. However, there is also critique against CSR. Banerjee (2008) writes in his critical article on CSR that the rationale and assumptions behind CSR found in the literature are:

1. corporations should think beyond making money and pay attention to social and environmental issues;
2. corporations should behave in an ethical manner and demonstrate the highest level of integrity and transparency in all their operations;
3. corporations should be involved with the community they operate in terms of enhancing social welfare and providing community support through philanthropy or other mean.

He further writes that actions, such as corporations "social responsibility reports", can be considered a form of greenwashing. Since corporations' primary incentive is to maximize economic return for their stakeholders, any act of "social good" or "social sustainability" by the corporation has through history only been a derivative from the economic function the act provided. Further, Banerjee states that decoupling "the economic" from "the social" is a political process and actors responsible for adverse social and environmental effects should not be driven by economic incentives. For CSR to serve society instead of corporations, he writes, a more critical approach towards organization theory is required, which might include frameworks for organization-stakeholder dialogues as well as critically examining the dynamics of the relationships between corporations, NGOs, governments, community groups and funding agencies. In this context, performing social performance assessments might help scrutinize corporations' claims and CSR activities, thereby providing a less biased view of social impacts.

## 2.2 Social Life Cycle Assessment

The companies who wish to conduct their business in a more responsible manner are seeking tools that could contribute to identifying risks for potential social impacts throughout the life cycle. SLCA constitutes one potential method for evaluating and communicating potential social impacts connected to a product value chain (UNEP, 2020). SLCA is a relatively new method but has shown potential in interpreting social data from the value chain of a product. There is no developed standard, but there are guidelines developed by the Life Cycle Initiative hosted by UNEP and the Society for Environmental Chemistry and Toxicology (SETAC). They describe several available methodologies for performing an SLCA in their guidelines, which are further specified in terms of e.g. potential data sources in the report called “Methodological Sheets” (UNEP, 2021). The methodological sheets also provide an overview of the procedure of SLCA and provide examples of relevant social indicators for different social issues (Dunmade & Anjola, 2019). Although the SLCA method as described in the guidelines has a broad range of applications, Dreyer et al. (2006) suggest that contemporary SLCA largely adopts a company perspective and that a framework that would capture social sustainability from a broader societal perspective might look different.

The first version of the guidelines was published in 2009 by UNEP/SETAC with a subsequent publication of a first version of the “Methodological sheets” (Benoît-Norris et al., 2011). However, that version of the guidelines was lacking information on specific impact assessment methods. In the newer version of the guidelines published in 2021, two general types of impact assessment methods are suggested: The reference scale approach and the impact pathway approach (UNEP, 2021). The reference scale approach does not assess actual social impacts along a cause-effect chain, since those “relationships are not simple enough or not known with enough precision to allow quantitative cause-effect modelling” (Chhipi-Shrestha et al., 2014). There have been different ways to present impact assessment results when using the reference scale approach, but ordinal scoring scales are frequently applied and translated into traffic-light colours, highlighting potential social impacts.

The use of ordinal scales in social impact assessment has, however, been criticized. Arvidsson (2019) points out that for ordinal scales, the distance between two points (e.g., +1 and +2 in a reference scale with scores from -2 to +2) is not known, since they are not actual (natural) numbers but have been derived based on company performance criteria. Therefore, it is strictly not allowed to conduct common mathematical operations using ordinal scales, such as addition, subtraction, multiplication, and division. Still, this is commonly done in studies applying the reference scale approach.

The impact pathway method is about trying to assess the cause-effect chain using scoring systems to aggregate the collected data connected to chosen indicators. Instead of relying on ordinal scale assessments, this approach intends to quantify actual social impacts stemming from product life cycles. Examples of such SLCA approaches are to assess disability-adjusted life years (DALY) as a quantification of health impacts along product life cycles (Arvidsson et al., 2018), and assessing the broader quality-adjusted life years (QALY) that considers not only health but also other aspects of wellbeing (Weidema, 2006).

## 2.3 Technical description

Cotton is a natural cellulosic fibre and is classified as a seed fibre, since the seed is the plant component from which the cotton is removed. Cotton grows in areas where the temperature is around 21°C. The cotton crop requires at least 50 cm of rainwater per plant, and in areas where rainfall is low, irrigation is needed. High water intensity and undeveloped water management systems has resulted in impacts such as rivers and lakes drying up. The cotton grows on bushes 0.9-1.8 m high. The cotton fibres are formed inside seed pods and grow there until the seedpod splits. The cotton picking can be conducted using machinery or manual labour. The raw material extraction and processing can for this specific value chain be called cotton cultivation, which includes ginning and baling. Ginning is the process where cotton fibres are separated from the seeds. The fibres are later pressed into bales and then become ready for transport to the next step in the value chain. Both the picking and ginning influences the end-product fibre quality (Kadolph, 2014). Material production, i.e. the fabric production, contains the processes of spinning the fibres into yarn, weaving the yarn into fabric, and lastly applying finish or dye necessary for the fabrics' final characteristics. The spinning process is conducted using machinery and consists of opening (to clean the fibres), carding (to align the fibres), drawing (parallel and blend fibres), combing (remove short fibres), roving (inserts slight twist) and lastly spinning. The weaving is done by automated or manual looms. The dying of denim fabric is done with either organic or synthetic indigo dye. To prepare the fibre for spinning, or the yarn for weaving, additional application of for example lubricants or sizing can occur (Kadolph, 2014). A simplified flowchart of the production of denim fabric can be seen in Figure 2.1.

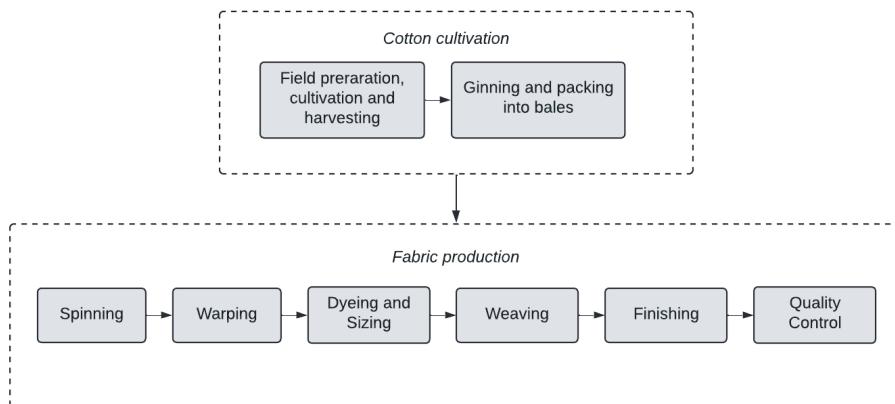


Figure 2.1. Simplified flow chart for denim fabric production.

## 2.4 Hazards in the value chain

The workers in the textile industry are exposed to several hazards, including mechanical, chemical, biological, ergonomic, and psychosocial. The mechanical is for example the cotton dust, which could consist of ground-level plant matter, fibre lints, microscopic organisms, parasites, soil, and pesticides. Cotton dust is also present in the manufacturing processes at textile mills. Over exposure of the cotton dust could lead to respiratory disorders. The occupational safety and health administration cotton standards have set different acceptable limits of cotton dust per cubic metre of air depending on the process: 200 mg/m<sup>3</sup> for spinning, 500 mg/m<sup>3</sup> for the material waste house and 750 mg/m<sup>3</sup> for weaving (Annapoorani, 2017).

Chemical hazards are present in the dyeing and finishing processes in textile manufacturing as well as in conventional cotton cultivation. Formaldehyde is one chemical that has through research been coupled to nasal and lung cancer (Annapoorani, 2017). Annapoorani (2017) further writes that musculoskeletal disorder is a recognized work-related health issue. In the textile industry, it is common for workers to be lifting, pulling, and moving heavy goods, which is one of the gradual reasons for ergonomic hazard. Other examples of detected issues within the work environment are exposure to loud noise, especially from spinning and weaving machineries.

Even though there is national legislation that directs wages and working hours, issues regarding these topics have been discovered. Examples are that the minimum wages are insufficient for daily expenses, overtime required to fulfil targets without compensation, and not reaching targets or attending late could result in rejection or dismissal. Many factories also have no labour union present or involved in decision making (Annapoorani, 2017).

### 2.5 Turkey and Cotton Cultivation

Turkey's area of 770 000 km<sup>2</sup> covers mostly Asian but also some European ground. The population was around 84 million in 2021 and include two main ethnic groups: Turks and Kurds. The nation was proclaimed in 1923 but its early history goes back to the Byzantine and Ottoman empires. The country has since 1923 experienced both civil and military governments and been in several conflicts with their neighbouring countries. Today, the country is struggling with ethnic tension with Kurdish separatists and political turmoil between Islamists and secularists (Britannica, n.d.). One topic still in need of development is the increasing gender inequality. In 2022, Turkey withdrew from the Council of Europe Convention on combating and preventing violence against women and domestic violence, called the Istanbul Convention. Their decision was argued to be based on that the Istanbul Convention goes against Turkey's family values and position regarding HBTQI community rights. Amnesty reports that 280 women in Turkey were killed during 2021 because of gender-based violence (Amnesty, 2022).

The Swedish international development cooperation agency, SIDA, reports decreased poverty and higher living standards in Turkey, as well as a national ambition to meet international conventions on human rights (SIDA, n.d.). One example of higher living standards is that the minimum salary increased from 2826 Turkish Lira (TL) per month in 2018, to 4250 TL per month in 2022. However, this is partly due to the high inflation rate of the Turkish Lira in recent years. Comparing the foreign exchange rate according to the European Central Bank, in May 2018, 1 Euro was worth 4.98 TL. In the end of 2021, 1 Euro is worth 15.94 TL (European Central Bank, n.d.). This affects the minimum necessary income to meet the basic needs, as commodities become more expensive.

Turkey has through history been a nation of agricultural practices. One third of Turkey is today utilised for agriculture. The Aegean region has the most commercialised and productive farmland, where cotton is the most popular industrial crop. Turkey is amongst the seven countries that produce 80% of the global cotton supply. Turkey has earned a good reputation within organic cotton supply due to their use of non-transgenic seeds, which brands the cotton as "GMO free" (Tokel et al., 2021). In 2019/2020, there

## 2. Background

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were around 600 farmers that cultivated about 24 000 tonnes of organic cotton fibres on 12 000 ha, which was a 6% increase in fibre production compared to the year before. Due to global trade laws, such as higher import costs, but also a higher demand for organic cotton in companies sourcing portfolios, Turkey's organic cotton production is predicted to grow by 177% in 2022 (Textile Exchange, 2021). Farmers are often flexible with their crops and choose the seasonal crop depending on the market. Some social challenges that farmers face are inadequate technical and financial training, lack of farmer unionisation and no institution for the organic cotton community (Textile Exchange, 2021).

Based on an interview with the author, activist and former employee at the ministry of agriculture in Turkey, Abdullah Aysu, some other challenges could be identified. Aysu states that the biggest challenge in Turkey is the business of the agriculture system, where small scale farmers become dependent on large companies. He also mentioned that there is an absence of support from the government to aid small-scale farmers. Further, most Turkish farmers do not have higher education than primary school and sometimes no education at all before going into farming. About 88% of the farmers in Turkey are small-scale farmers. Most of the farmers own their land and it is very hard for farmers to sell their land if they want to. Aysu describes that not many are interested in buying agricultural land due to the hard conditions of being a farmer. Often, the agricultural land is divided among family members and therefore not large enough to sell as any other land type, such as land for new buildings.

The textile industry in Turkey plays an important role in creating work opportunities and bringing foreign exchange to the country. According to the World Trade Organization (WTO), Turkey was ranked as the fourth largest exporter of textiles in the world in 2020, with a trade volume worth 12 billion US dollars (World Trade Organization, 2021). Textiles and clothing are the main exported goods, where clothing accounts for 3.3% of the global trade.

In Turkey, wages for agricultural practices were reported to be 127 TL/day in 2021 (Turkish Statistical Institute, n.d.). The reported labour wage for the region Aydin, where the cotton field of this study is located, was 131/day TL for male and 88 TL/ day for female agricultural workers (Turkish Statistical Institute, n.d.). The latest living wage, which is a measure of minimum necessary income to meet the worker's basic needs, is reported in the Fair Wear Foundation Country Report 2018 by Türk-İş (Confederation of Turkish Trade Unions). It was there stated as 5492 TL/month (or about 183 TL/day) and has not been updated since. The living wage is based on one worker in a family of four (Fair Wear Foundation, 2018). In comparison, the agricultural wage reported in 2021 is less than the living wage proposed by Fair Wear Foundation.

# 3

# Method

In this study, SLCA is applied to investigate the research question stated in Section 1.1. The methodology is based on the Life Cycle Initiative's and UNEP's Guidelines for SLCA of Products and Organisations (UNEP, 2020). The recommended procedure for an SLCA contains the following steps according to the SLCA guidelines: Goal and scope, life cycle inventory, impact assessment and interpretation. These four steps are described in more detail below.

The goal and scope of an SLCA aim to specify why and for whom the study is conducted. The scope further describes the assessment setup in detail, as seen in Figure 3.1. The scope has been defined in collaboration with Nudie Jeans whose product is under study.

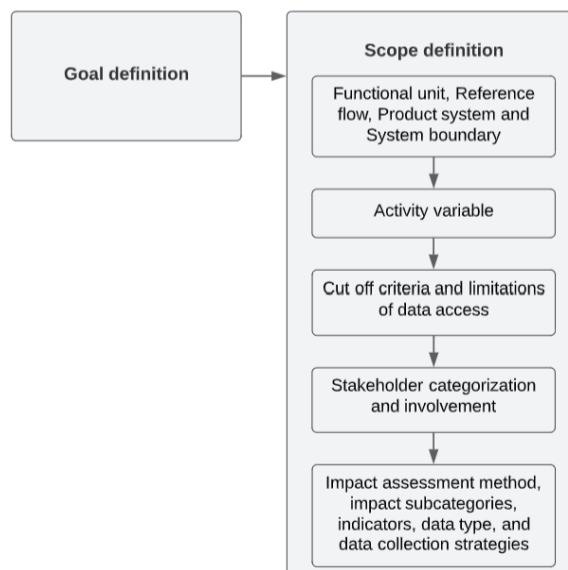


Figure 3.1. Procedure of the goal and scope step (UNEP,2020).

## 3.1 Goal of the study

The SLCA aims to assess relevant stages in the value chain of denim fabric produced in Turkey regarding the risks for potential social impacts, as stated in Section 1.1. This SLCA study applies the SLCA Guidelines by UNEP from 2021 in a case study and examines the outcome through a hotspot analysis.

### 3.2 Scope

The product in focus is denim fabric used for the denim jeans called “Organic Mazikeen Trueblue”, sold by Nudie Jeans. The product system’s functional unit (FU) is defined as 1 kg denim fabric made of 100% organic Turkish cotton. The reference flow is the same as the FU. The product’s functionality is to cover the body while being comfortable and durable. The price range is approximately 1500-2500 SEK per pair, and the consumers are both men and women. In Figure 3.2, a flowchart of the studied system is presented.

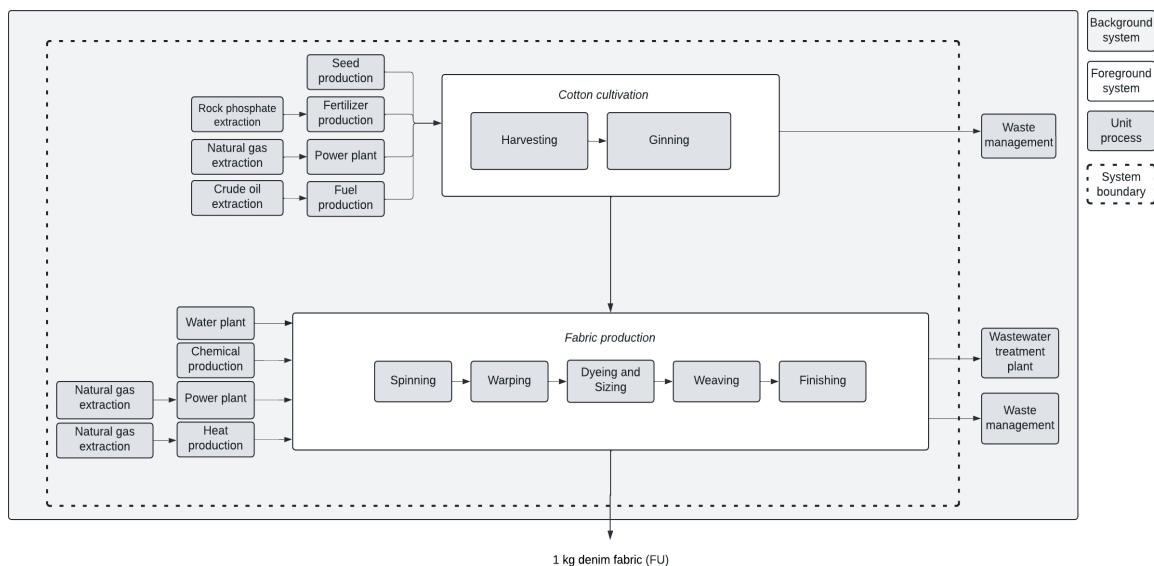


Figure 3.2. Flowchart showing the cradle-to-gate product system of the studied denim fabric.

The two main activities in the product system, cotton cultivation and fabric production, and the processes within those activities, can also be seen in Figure 3.2. The system boundaries are set to include unit processes in both a foreground and a background system. The foreground system includes the two main activities. The background system represents critical input processes to the foreground system. The system boundaries can also be referred to as cradle to gate.

As for geographical boundaries, both foreground activities occur in Turkey at two different sites. The cotton cultivation takes place in Söke, and the fabric production in Adana. The assumed transportation route between these two places can be seen in Figure 3.3. The SLCA also involved sites outside Turkey as per the locations of the background processes. However, neither transports nor waste treatment were included.



Figure 3.3. Geographical locations of the foreground system activities.

### 3.2.1 Stakeholders and subcategories

The UNEP Guidelines (2020) use a stakeholder approach to identify risks for potential social impacts of different stakeholder subcategories: “Concerning stakeholder categories, the quality of an organization’s relationships and engagement with its stakeholders is critical for its social performance. Directly or indirectly, organizations affect what happens to the stakeholders, and it is important to manage these social impacts proactively.” The stakeholders considered in the UNEP Guidelines are Workers, Local communities, Value chain actors, Consumers, Children, and Society. One could also consider additional stakeholder categories, but this assessment considers the original set to facilitate comparisons with other studies that have used the UNEP Guidelines.

The stakeholder categories and subcategories included in this study were selected in collaboration with the Sustainability Manager at Nudie Jeans. The stakeholder category Worker is in focus, while Consumers, Children and Society are excluded. As for consumers, it was excluded due to the system boundaries of the product system, which do not include the use phase of the denim fabric. Children and Society were not assessed due to time constraints. However, there are some subcategories under Workers and Local community that examine some aspects of Children and Society, such as Child labour and Access to material resources. Among the six suggested stakeholder categories in the UNEP Guidelines, this assessment thus considers Workers, Local community, and Value chain actors. The subcategories considered are shown in Table 3.1. The next section explains the subcategories and presents the inventory data needed to assess the risk for potential social impacts.

Table 3.1. Included stakeholder categories and subcategories.

Stakeholder categories	Subcategories
Worker	Freedom of association and collective bargaining Child labour Fair salary Working hours Forced labour Equal opportunities Health and safety Employment relationship Sexual harassment
Local community	Access to material resources Safe and healthy living conditions Local employment
Value chain actors	Supplier relationship

#### 3.2.2.1. Worker: Freedom of association and collective bargaining

This subcategory assesses the freedom of association and collective bargaining for all employees and workers. It considers the right to join and establish any unions, organisations, and associations of their own free choice (UNEP, 2021). There should be no interference of authorities or discrimination towards workers’ and employees’

choice in these questions. This subcategory also includes the right to strike, negotiate employment contracts and freely select representations for unions and organisations (Goedkoop et al., 2020).

#### *3.2.2.2. Worker: Child labour*

Work that deprives children from attending school or inhibits them from completing school, could be dangerous and harmful mentally, physically, socially, and morally (UNEP, 2021). Child labour generally applies to children 15 years old or younger. However, if the work involves hazardous elements or if it is morally dubious, the age limit is 18 years old. The subcategory refers to the level of engagement from the company in the issue, as well as their efforts towards eradicating and proactively trying to raise awareness of child labour in the society and local community (Goedkoop et al., 2020).

#### *3.2.2.3. Worker: Fair salary*

The subcategory Fair salary examines if the worker performing the job is getting a wage reasonable to the service or work performed. When assessing Fair salary, there are three standard definitions of wage that can be used: minimum wage, prevailing industry wage and a living wage. The legal minimum wage is often insufficient to meet the basic need but is used to attract investments in countries and therefore kept artificially low. The prevailing wage can be either minimum or higher depending on the industry and is therefore an ambiguous term. Therefore, the living wage is a discretionary income implemented by organisations to ensure that workers have a salary covering their basic needs, for example, in terms of food and health care (UNEP, 2021).

#### *3.2.2.4. Worker: Working hours*

Working hours are based on laws and standards connected to the specific industry and country. However, workers should have at least one day off in 7 days and not work more than 48 hours weekly. Overtime should not exceed 12 hours per week and should be voluntary and paid at a premium rate. The subcategory assesses the number of hours worked compared to the ILO standard and verifies that overtime is voluntary and compensated for (UNEP, 2021).

#### *3.2.2.5. Worker: Forced labour*

Forced labour considers any form of labour that is not voluntary and under the menace of any action that can be seen as a penalty. Compensation or a wage for the work does not imply that it is not forced or compulsory labour. The workers should also be able to leave the employment within the established rules by the written work agreement (UNEP, 2021). The subcategory assesses whether forced labour is present in the company itself and the extent to which the company raises awareness and works against eradicating forced labour.

#### *3.2.2.6. Worker: Equal opportunities / Discrimination*

This subcategory assesses the engagement of the company in preventing discrimination in its organisation. There are different types of discrimination, which can be divided into three groups. The first is direct discrimination that considers the less favourable treatment of a person versus another in the same setting or circumstance, for example, regarding education, employment, or other benefits. The second is indirect discrimination, which includes a neutral rule's negative effect on people with different

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characteristics or attributes. A seemingly neutral rule that affects people differently might still be considered unfair. The third and last type of discrimination considered by UNEP Guidelines is reverse discrimination, which intends to remedy discrimination of a minority or group of disadvantage but instead affects the majority group (UNEP, 2021). Finally, equal opportunities focus on that everyone should get a fair chance, regardless of, for example, age, sex or religious orientation.

#### *3.2.2.7. Worker: Health and safety*

This subcategory is assessed based on the Occupational Health and Safety (OHS) definition of the World Health Organisation (WHO), which reads: “Occupational health should aim at: the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarise, the adaptation of work to man and of each man to his job.” (UNEP, 2021)

The workplace should also be safe and healthy regarding hazards and follow the Occupational Safety and Health Administration (OSHA) standard. The subcategory considers the incidents connected to these definitions and the companies’ management system and engagement in preventing such work-related incidents (UNEP, 2021).

#### *3.2.2.8. Worker: Employment relationship*

According to the ILO, good employment relationships between the employer and employee are highly important. This relationship creates reciprocal rights and obligations that each party should follow. Furthermore, through this relationship, the worker gains access to social benefits and rights connected to the labour law and social security. Therefore, this subcategory investigates the employment relationship in terms of the kind of contract present in the work agreement, the rights within the agreement and what rights the worker has access to (UNEP, 2021).

#### *3.2.2.9. Worker: Sexual harassment*

There are two different forms of sexual harassment, according to the ILO. The first form is quid pro quo, which takes place if an employee gets a job benefit if the employee agrees to perform any sexual act or behaviour. The second form takes place in a workplace that creates intimidating or humiliating conditions for an employee. These conditions can be physical, verbal or non-verbal and can occur to all genders. The subcategory assesses if incidents have happened within the organisation and the level of engagement from the company in the issue (UNEP, 2021).

#### *3.2.2.10. Local community: Access to material resources*

This subcategory refers to the extent of mitigation of adverse impacts from the company on the local community regarding access to material and immaterial resources, such as homelands, forest lands, water, clean soil, electricity, infrastructure, cultural heritage and biological resources. It also refers to the extent of restoration and improvement of such resources for the community. Without these primary resources, vulnerable groups of people in society will likely suffer (Goedkoop et al., 2020). To mitigate the potential negative impacts of using material resources, companies and organisations should have

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risk management plans to ensure sustainable use of natural resources, prevent pollution and recycle waste.

#### 3.2.2.11. Local community: Safe and healthy living conditions

Safe and healthy living conditions refer to how the company can mitigate negative and enhance positive impacts on the local community. These impacts consider general safety towards vulnerable groups, such as accidents that can occur due to structural failures of buildings or unsafe equipment. The subcategory also considers safety regarding land-use changes and natural disasters caused by business-related impacts, such as landslides or poor water drainage (Goedkoop et al., 2020). Another aspect connected to the subcategory is the exposure to hazardous materials and pollution, causing health impacts on the local community. Companies and organisations should have environmental risk management systems to reduce the negative impact of their operations on health and safety. However, general health and safety risks can often be challenging to connect to a specific product, company, or organisation (UNEP, 2021).

#### 3.2.2.12. Local community: Local employment

Local employment refers to the number of local hiring preferences contributing to significant income for the local community. In addition, local employment's direct and indirect effect contributes to training opportunities in technical and transferable skills, which can create a resilient and healthy community (UNEP, 2021).

#### 3.2.2.13. Value chain actors: Supplier relationship

A supplier is any business or organisation that provides a company with goods and services. It can, for example, be subcontractors and manufacturers working to support a company and have substantial impacts on the value chain (UNEP, 2021). This subcategory mainly focuses on fair trading terms for small-scale businesses and their relationship with others in the value chain. In addition, it examines the state of the collaboration between the company and suppliers, the information sharing, the length of the relationship and to what degree the contracted trading terms are respected (Goedkoop et al., 2020).

## 3.3 Inventory Analysis

Since the impact assessment is based on the Reference Scale Approach (Section 3.4), the life cycle inventory analysis was performed by collecting social performance data for all activities related to the physical flows of the studied system and thereafter normalising the data to the functional unit. The procedure is shown in Figure 3.4 and was based on suggestions from the methodological sheets (UNEP, 2021). The reference scale approach is described in Section 3.4.

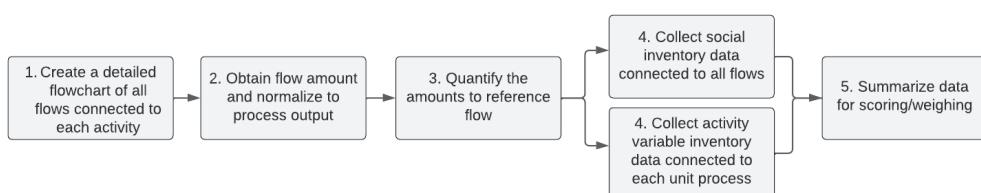


Figure 3.4. Life cycle inventory procedure (UNEP, 2021).

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The material flow for the foreground system have been mainly retrieved from the report “Comparative Life Cycle Assessment of Jeans” by Åslund Hedman (2018). The data in that report is site specific, retrieved from the same value chain actors as considered in this study, but in 2018. The complementing literature that was used for the material flow was “An environmental assessment on a pair of jeans reported” by Mistra Future Fashion Report (Sandin et al., 2019) and from the “Organic Cotton Market Report 2021” by Textile Exchange (Textile Exchange, 2021).

The data needed to perform the subsequent steps included site-specific visits to the activities. The quantitative data collected regarding the activity variable was scaled to the process output for each unit process. According to the UNEP Guidelines, the activity variable is a measure of process activity, which can be related to process output. An activity variable is used to reflect the share of a given activity associated with each unit process. Further, the activity variable helps represent the product system in a way that gives an idea of the relative significance of each unit process in the whole product system (UNEP,2021). Examples of activity variables are worker hours and added value. Worker hours consist of the number of hours of work necessary to complete a unit process. Added value considers the amount of value created in each process.

For this study, the activity variable worker hours were chosen due to data accessibility and relevant contribution to the hotspot analysis. Additional assumptions complementing the previously mentioned reports regarding the unit processes in the foreground system used to calculate the activity variable can be seen in Table 3.2. The assumptions are based on field visits to the activities.

Table 3.2. Assumptions regarding the activity variable for the foreground system.

Unit process	Calculation assumptions
Harvesting	<ul style="list-style-type: none"><li>• 4 ha assumed for organic cotton cultivation land area</li><li>• 8 hours/day and 6 days/week working time</li></ul>
Ginning	<ul style="list-style-type: none"><li>• Productivity data based on 24 hours/day and 7 days/week working time</li></ul>
Spinning	<ul style="list-style-type: none"><li>• Factory open 24 hours/day and 7 days/week</li></ul>
Dyeing and sizing	<ul style="list-style-type: none"><li>• The productivity of the slasher is based on the Looptex technology by the Italian textile machinery manufacturer Mezzera</li></ul>
Weaving	<ul style="list-style-type: none"><li>• Conversion factor from metre to kilogram based on finished fabric weight (0.54 kg/m)</li></ul>

The data collection for the activity variable, worker hours, in the background system differ from the foreground system as the companies present in the background system could not be visited. Table 3.3 presents the assumptions that were made for calculating the worker hours used in Equation 1.

Table 3.3. Assumptions regarding the activity variable for the background system.

Unit process	Calculation assumptions
Fertilizer production	<ul style="list-style-type: none"> <li>• 24 hours/day and 7 days/week working time</li> </ul>
Electricity production, Natural gas production, Chemical production, and Crude oil production	<ul style="list-style-type: none"> <li>• 24 hours/day and 7 days/week working time</li> <li>• 3 shifts</li> </ul>

Equation 1 shows how the activity variable for the foreground and background system is calculated:

$$\text{Worker hour for unit process} = \frac{\text{Amount input needed for FU}}{\text{Output per hour and worker}} \quad (\text{Equation 1})$$

Step four in Figure 3.4 was the most time-consuming as it required several methods to target the specific subcategory, activity, or stakeholder. Social data on the foreground system relied mainly on semi-structured interviews. The data collection was based on a qualitative study to grasp the context of the subcategories. The collected data could then be converted into semi-quantitative data since the interview questions are based on the indicators of the subcategories, presented in Section 3.4.

For the social inventory data, no quantitative data or country-level data is used because often segments of marginalised people such as immigrants are not considered in such datasets (Borsuk, Personal Communication, 25 April 2022). This is necessary since this group is generally involved in cotton cultivation but is not registered with work permissions in Turkey.

The actors and involved organisations that together constitute the value chain in focus can be seen in Figure 3.5. The audit reports have been conducted previous years at the site. The collected data is presented as an input for the activity assessed.

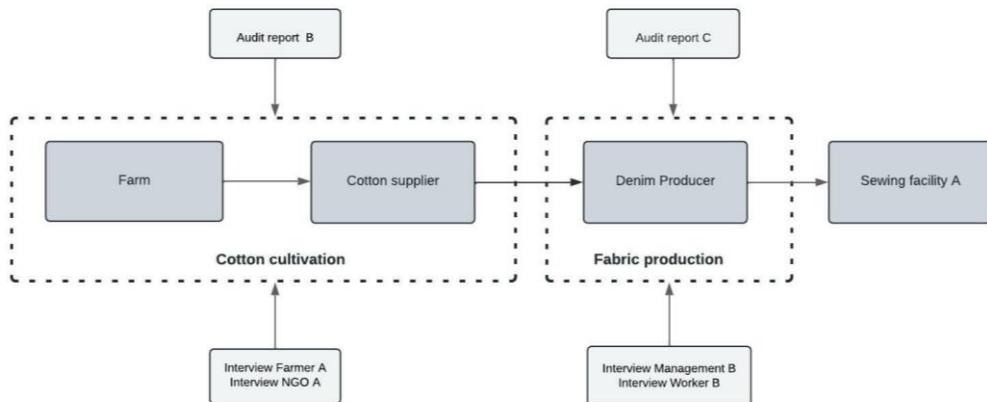


Figure 3.5. Value chain actors and organizations, as well as data sources for the respective activities.

A field trip to Turkey provided the assessment with further site-specific data and context, which involved visits at every activity in the foreground system. Methods like interviews and questionnaires were prepared to collect both qualitative and semi-qualitative data. Interviews were conducted with: Worker, Management and an NGO connected to the activities to obtain different perspectives on the same subcategory. This is illustrated in Figure 3.5. The interview questions can be seen in Appendix A.1. The field visits provided empirical observations that are presented as a result together with the specific social inventory data.

The external parties seen in Table 3.4 are organisations that have conducted social monitoring. The farm level audits were initiated by Denim Producer A to get certified by NGO B. The audit performed on fabric production was initiated by Nudie Jeans. Table 3.4 presents the foreground-system data collected for the SLCA.

Table 3.4. Data used connected to each activity in the foreground system.

Activity	Value Chain Actor	City	External parties	Primary data sources
Cotton cultivation	Cotton Supplier A	Söke	NGO A NGO B	Interview Farmer A Interview NGO A Audit report B
Fabric production	Denim Producer A	Adana	NGO A NGO C	Interview Management B Interview Worker B Audit report C

Nudie Jeans joined forces with NGO A to support and protect the cotton farmers in 2020. NGO A monitors and directly contacts workers to facilitate the process of creating safer working conditions and resolving issues related to exploitation. NGO A has provided data to the SLCA through an interview. The interview questions and set-up can be seen in Appendix A. The NGO is specialized in the region where the cotton field connected to the specific value chain is located. However, their grievance channel might also collect grievances from workers at other cotton fields that are not connected to the specific value chain in focus.

NGO B is an organisation that provides standardised certifications, which Nudie Jeans received in 2020. The standard is divided into four key features: organic fibres, ecological and social criteria, all processing stages, and third-party verification. Regarding the ecological and social criteria, the social criteria rely on the key norms of the ILO, United Nations Guiding Principles on Business and Human Rights (UNGPs) and Organisation for Economic Cooperation and Development (OECD) as the basis for the social criteria that must be met. Some highlighted categories are: Employment is freely chosen, Freedom of association and collective bargaining, Child labour shall not be used and Occupational health and safety (GOTS, 2022). NGO B relies on a third party to conduct and verify the criteria. Therefore, Audit report B has been written by a third party that has been commissioned to make the social audits. NGO B and Audit report B provide data to the SLCA in the form of a social audit report.

NGO C works as an ethical trade membership organisation. Members get access to tools and services for improving working conditions in the supply chain. One of these services is social audit compliances, which have been applied on the factory of the

fabric production in the product value chain. The audits are made in alignment with the Sedex Members Ethical Trade Audit (SMETA) minimum requirements. The four pillars are: Labour Standards, Health and Safety, Business Ethics and Environment. Within the pillars, topics regarding wages, working hours and discrimination are addressed. Audit report C is used in the assessment.

Collection of social inventory data for the background system differs from the foreground system, as the organisations of the background system could not be visited. Therefore, a general literature review was performed for these activities. Based on information from actors in the foreground system and Turkish import data, the country from where the input is produced could be identified. Further, the assessment used the largest and most well-known corporation as manufacturer of the input, and accessed reports on social issues in that company. The reports are presented in Section 4.1.2.

To ensure the safety and handling of personal data, the participants have signed a consent form. The participants are referred to by their main occupation and role in the value chain. No names are published in the report due to personal integrity and security.

#### 3.3.1 Cut off criteria and limitations of data access

The study has excluded the denim jeans production, distribution, use phase and end of life due to time constraints and geographical convenience. The time limitation applied to the unit processes in the background system as well. The inputs that were cut off were transports, wastewater treatment, waste management and heat production. The input chemicals for fabric production were not studied individually but assumed to be from the same production facility.

### 3.4 Impact assessment

In the social life cycle impact assessment, the risk for potential social impacts is assessed based on the interviews and audit data. The Reference Scale Approach was chosen as the impact assessment method. Since the goal of the study is to identify the risks for social impacts of the product system, it was suitable to use this specific SLCA approach to conduct an assessment based on performance relative to a current reference point. Since Nudie Jeans has not conducted any prior SLCA, the Reference Scale Approach could provide an early overview of the hotspots in the product system. Hotspots are locations in the system where the SLCA results show high risks for potential social impacts.

When comparing the inventory data to the performance reference points, the reference scale was used. Instead of developing a reference scale specific to the study, the SLCA applies an existing reference scale used in similar social assessments. PRé Sustainability, an organisation within consulting of sustainability metrics and life cycle thinking, has through PRé Sustainability and the members of the Roundtable for Product Social Metrics developed a handbook that contains relevant reference scales (Goedkoop et al, 2020). The purpose of the handbook is to assess social impacts throughout the life cycle of products and to provide a clear and consensus-based methodology as support for social issues in design, production, and marketing (Goedkoop et al., 2020). By using indicators presented by UNEP Guidelines and the reference scale by PRé Sustainability, potential social impacts can be identified, and hotspot identification assessed of products and services. The reference scale is constructed with five different levels: -2, -1, 0, +1 and +2. It furthermore focuses on

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companies' engagement in different subcategories. The general reference scale provided by Goedkoop et al. can be seen in Table 3.5. The impact assessment in this study relies on the reference scales provided in that handbook.

Table 3.5. General reference scale. Modified from Goedkoop et al. (2020).

Scoring	Definition of scale level
+2	Best in class, continuous improvement
+1	Beyond generally acceptable situation, continuous improvement
0	Generally acceptable situation
-1	Unacceptable situation, but improving
-2	Unacceptable situation, no improvement

In Table 3.6, the reference scale used for each subcategory can be seen. For a more detailed description, see Appendix B.1. Since the subcategories are retrieved from the UNEP Guidelines (2021) and the reference scales from PRé's handbook (2020), reference scales were not available for every subcategory. This applies to the subcategory's Sexual harassment, Local employment, and Supplier relationship, which are not included in PRé's handbook. Reference scales for these subcategories were therefore created by modifying already existing reference scales for similar social topics. Subcategories such as Working hours and Employment relationship had no similarities with any reference scale in PRé's handbook and was therefore constructed using the same scoring principle as the one in Table 3.5, but targeting the social issues described in UNEP Guidelines.

Table 3.6. Reference scale used for each subcategory.

Stakeholder category	Subcategory	Reference Scale
Worker	Freedom of association and collective bargaining	PRé's handbook: Social topics for workers: Freedom of association and collective bargaining
	Child labour	PRé's handbook: Social topics for workers: Child labour
	Fair salary	PRé's handbook: Social topics for workers: Remuneration
	Working hours	<b>Constructed with inspiration from</b> PRé's handbook
	Forced labour	PRé's handbook: Social topics for workers: Forced labour

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	Equal opportunities	PRé's handbook: Social topics for workers: Discrimination
	Health and safety	PRé's handbook: Social topics for workers: Occupational health and safety
	Employment relationship	<b>Constructed with inspiration from</b> PRé's handbook
	Sexual harassment	<b>Modified version of</b> PRé's handbook: Social topics for workers: Discrimination
Local community	Access to material resources	PRé's handbook: Social topics for local communities: Access material and immaterial resources
	Safe and healthy living conditions	PRé's handbook: Social topics for local communities: Health and Safety
	Local employment	<b>Modified version of</b> PRé's handbook: Social topics for local communities: Skill development <b>and</b> Contribution to economic development
Value chain actors	Supplier relationship	<b>Modified version of</b> PRé's handbook: Small-scale entrepreneurs and Fair trading relationship

To create relevant questionnaires for the data collection and later annotate the subcategories with relevant scoring, indicators were developed. The most frequent indicators used for the subcategories in the assessment are incidents, engagement, and presence of action plan, see Table 3.7. There are between two and three indicators for each subcategory, which are based on the already existing and modified reference scales from PRé's handbook, or from the constructed reference scales. Table 3.7 presents the stakeholder category, subcategory, indicator, unit and explanations of the indicators. All indicators are qualitative, except when measuring the share of workforce hired locally in the subcategory Local employment, which is quantitative. The answers from the interview are referring to the year 2021 if no other year is stated in the explanation of the indicator. To clarify incidents, referral is made to Section 3.2.2.1-3.2.2.13 for definition of the subcategories as well as to Appendix B.1.

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Table 3.7. Reference scale used for each subcategory.

<b>Stakeholder Category</b>	<b>Subcategory</b>	<b>Indicator</b>	<b>Unit</b>	<b>Explanation of indicator</b>
Worker	Freedom of association and collective bargaining	Engagement	y/n	Possibility of participation and communication
		Incidents	Incidents / No incidents	Any incidents regarding the subcategory
		Action plan	y/n	Action plan according to collective bargaining agreement
	Child labour	Engagement	y/n	Priority, awareness, management system
		Incidents	Incidents / No incidents	Any incidents regarding the subcategory
		Action plan	y/n	Action plan in place to address the issue
	Fair salary	Wage level	Above / Below	Paid living wage. 5492 TL/month for a family of four (Fair Wear Foundation, 2018)
		Social Benefits	y/n	According to industry standards
	Working hours	Engagement	y/n	Proactive work and flexibility of working hours
		Working hours	More / Standard-Less	Number of hours worked per week compared to industry standard and law. Maximum 40 h/week and 6 days a week (International Labour Organisation, 2014)
		Action plan	y/n	Action plan made to prevent illegal number of working hours
Forced labour	Engagement	y/n	Priority, awareness, management system	
	Incidents	Incidents / No incidents	Any incidents regarding the subcategory	
	Action plan	y/n	Action plan made to prevent forced labour	
	Equal opportunities	Engagement	y/n	Proactive work and management system

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		Incidents	Incidents / No incidents	Any incidents regarding the subcategory
		Action plan	y/n	Action plan made to prevent discrimination
Health and safety	Engagement	Engagement	y/n	Proactive work and management system
		Incidents	Incidents / No incidents	Any incidents regarding the subcategory
	Action plan	y/n	Action plan made to prevent incidents regarding health and safety	
Employment relationship	Engagement	y/n	Negotiation and level of protection in contract	
	Availability	y/n	Presence of contract	
Sexual harassment	Engagement	Engagement	y/n	Proactive work and management system
		Incidents	Incidents / No incidents	Any incidents regarding the subcategory
	Action plan	y/n	Action plan made to prevent sexual harassment	
Local community	Access to material resources	Engagement	y/n	Proactive work and management system
		Incidents	Incidents / No incidents	Any incidents regarding the subcategory
		Action plan	y/n	Action plan made to prevent damage on societies access to material resources
Safe and healthy living conditions	Engagement	Engagement	y/n	Proactive work and management system
		Incidents	Incidents / No incidents	Any incidents regarding the subcategory
		Action plan	y/n	Action plan made to prevent damage on society's healthy and safe living conditions
Local employment	Engagement	y/n	Skills, management and local engagement, business criteria	
	Amount	%	Workforce hired locally	

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		Action plan	y/n	To reduce skills gap
Value chain actor	Supplier relationship	Engagement	y/n	Collaboration and information sharing
		Agreement	Respected / Not respected	Trading terms are respected
		Action plan	y/n	Action plan made to prevent unfair trading relationships and corruption

The indicators are used to score the subcategories according to the reference scale in Appendix B.1 and the scoring procedure for the different subcategories can be seen in Figure 3.7. The general approach used is to start from the indicator measuring incidents, which have been used as a starting point for evaluating each subcategory. If no incident has occurred, the next step is to evaluate the level of the engagement by the company for the subcategory. Depending on the level of engagement, the subcategory can receive the scores +1 or +2. If there is no engagement, the score 0 are used by default. If incidents have occurred, there is no possibility for the subcategory to receive the scores +2, +1 and 0. However, there is a need to evaluate whether to assign the scores -1 or -2. This is done by investigating if there is an action plan or not. If there is an action plan for the incident, the subcategory has received -1 and if there is no action plan, the assigned score is -2.

There are some exceptions when it comes to the indicators and scoring. Fair salary has only two indicators and the score is evaluated according to a specific reference scale, see Figure 3.6. The subcategory Working hours considers whether the working hours are above or below industry standard when it comes to hours worked, instead of incidents. However, the same principle is applied; if the working hours is industry standard or less, the subcategory can receive +1 or +2 depending on the level of engagement by the company in the issue. But if the working hours are above industry standard, -1 or -2 is received as scoring depending on the presence of an action plan.

The subcategory Employment relationship has two indicators, and the starting point is to evaluate whether a written contract is available. If there is a written contract, the level of engagement can be evaluated, resulting in the scores +1 or +2, respectively. Without a written contract, the subcategory is scored -1 if there is a verbal contract and -2 if there is no contract at all. This subcategory is, as mentioned in Table 3.7, constructed with inspiration from the PRé's handbook to make it more applicable in the agricultural business.

Local employment considers the amount of the workforce hired locally. If everyone in the workforce is hired locally, the level of engagement is to be evaluated, either receiving the scores 0, +1 or +2. If everyone in the workforce are not hired locally, the score is -1 or -2 depending on how they work to reduce the skill gap in their local community.

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The subcategory Supplier relationship follows the same procedure as for the subcategories with incidents as starting point. However, instead of incidents, it considers if the trading terms are respected or not respected.

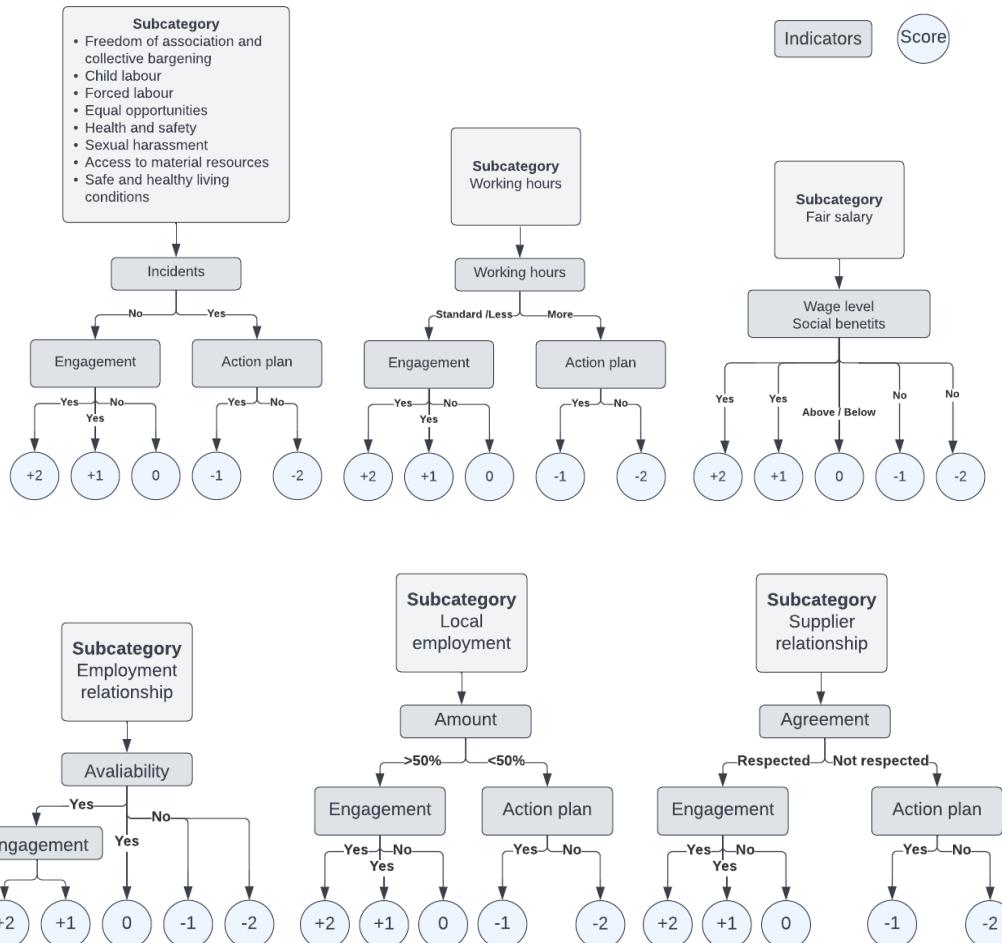


Figure 3.6. Decision tree showing the scoring system and underlying indicators.

Since different data sources report different values for some indicators, only the scoring for the actor considered most relevant is considered. The actors of importance have been decided to be the ones which are the most site specific. For cotton cultivation, this value chain actor is Farmer A and for fabric production it is Management B.

The background system was scored with the same reference scales and indicators as the foreground system, using Table 3.7. However, the background system only considers the subcategories Child labour, Fair salary, Forced labour and Health and safety. The background system was analysed regarding information from one single actor each instead of three actors as in the foreground system.

### 3.5 Interpretation

The final step in an SLCA is the interpretation, which is a key step in the methodology (UNEP,2020). The interpretation is an iterative process that contains a critical discussion of the outcome in relation to the goal and scope definition. It can consist of a completeness check, consistency check, sensitivity and data quality check, materiality assessment and conclusion, limitations, and recommendations according to the requirements of ISO 14044 (2006). The outcome of the iterative interpretation step requires a revisiting of previous steps in the SLCA, including the goal and scope definition, data collection and impact assessment. The interpretation step is used to try to increase the quality and consistency of the assessment for stakeholders to examine the outcome as a foundation for improvement work in areas where a high potential risk of negative social impact was detected.

This study conducts a sensitivity analysis. The sensitivity analysis presents a different scenario reflecting variation in the collected data for workers, management and NGOs. In total, four sensitivity analyses were conducted: (1) worst-case potential social impacts of the activities in the whole value chain, (2) foreground system scoring in the worst-case scenario, (3) worst-case potential social impacts of each unit process in the cotton cultivation activity, and (4) worst-case potential social impacts of each unit process in the fabric production activity.

# 4

# Results

This section presents the results from the inventory analysis, impact assessment and interpretation.

## 4.1 Inventory analysis results

This inventory analysis results section presents the data collected for the activity variable, observations from the field visits at the foregrounds activities and social inventory data. The results are divided into the foreground and background systems.

### 4.1.1 Foreground system

The foreground system includes the activities cotton cultivation and fabric production. The cotton cultivation unit processes include harvesting and ginning. The unit processes included within fabric production are spinning and warping, dyeing and sizing, weaving, and finishing.

#### 4.1.1.1 Activity variable data in foreground system

Results regarding the unit processes spinning and warping, dyeing and sizing, weaving and finishing are based on data from interviews with Management B and further calculations.

Table 4.1 shows the calculated worker hour per activity along the life cycle. In the cotton cultivation activity, the harvesting requires much more worker hours than the ginning. In the fabric production, the worker hour does not differ so much, although spinning and warping, as well as weaving, require the most worker-hours.

Table 4.1. Worker hours for foreground system per 1 kg finished fabric.

Activity	Unit process	Worker hours
Cotton Cultivation	Harvesting	1.15
	Ginning	<0.01
Fabric Production	Spinning and warping	0.04
	Dyeing and sizing	0.03
	Weaving	0.04
	Finishing	0.02

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### 4.1.1.2 Observations at cotton cultivation

Since the season for harvest is from September to October, no harvest workers were present during the field visit. Therefore, no observations could be made regarding the workers and their working conditions. A tour to the ginning operation was conducted, which is fully automated and supervised by 2-3 workers/season.

### 4.1.1.3 Observations at fabric production

Since the production taking place in the unit processes are mainly automated, the workers' primary tasks are to supervise the machines as well as moving material between the unit processes. This includes lining cotton bales, installing bobbins and moving beams. The weight of each bale is about 220 kg. Workers were exposed to loud noise and high temperature, yet earplugs were only used at the weaving unit process. Irritation in the nasal and throat area was experienced at the finishing unit process. Supervising the machines involved maintenance when interrupted by, for example, entangled threads or stuck fibres, which were then removed using delicate handwork and knives. Another observation was made at the beaming station, where workers had direct contact with the newly dyed warp. Since they were not wearing gloves, many of the workers had palms that was blue from the dyeing colour.

### 4.1.1.4 Inventory for cotton cultivation and fabric production

In Table 4.2, a summary of the collected social inventory data for the cotton cultivation is presented. Data from Farmer A is based on an interview, see questions in Appendix A.1. Data from NGO A is based on an online interview, see questions in Appendix A.1. Data from Audit Report B is site specific and obtained in 2021. Some categories could not be assessed because the participants (actors in value chain) either having lack of willingness, finding the question sensitive or having lack of knowledge to answer. As can be seen in Table 4.2, sometimes different actors responded differently to the questions.

Table 4.2. Social inventory data for the cotton cultivation.

Stakeholder Category	Subcategory	Actor in Value Chain	Indicator result	Comment
Worker	Freedom of association and collective bargaining	Farmer A	+2 +1 Yes 0 No incidents -1 -2	Direct communication to the ginner, if not the workers can talk to the union. However, the ginner and union do not have regular contact.
	Child labour	Farmer A	+2 +1 Yes 0 No incidents -1 -2	Follows management plans from the cotton buyer.
		NGO A	+2 +1 0 Incidents -1 Yes -2	Action plan made by national projects and organisations such as ILO.

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		Audit report B	+2 +1 0 No incidents -1 -2	No incidents, however, no further information.
Fair salary	Farmer A	Farmer A	+2 Yes +1 0 Above -1 -2	Salary 500 USD/month. Workers have social benefits according to law.
	NGO A	NGO A	+2 Yes +1 0 Below -1 -2	3300-4200 TL/month. Workers have social benefits.
	Audit report B	Audit report B	+2 +1 0 Below -1 -2 No	Paid minimum wage. The workers don't have a written contract and therefore no social security.
Working hours	Farmer A	Farmer A	+2 +1 0 Standard -1 -2	Overtime compensated and voluntary. Work 40h/week.
	NGO A	NGO A	+2 +1 0 -1 -2 More	No days off in the cultivation period. Not compensated for overtime. No management system in place. Work 12-14 h/day.
	Audit report B	Audit report B	+2 +1 0 Standard -1 -2	8 hours/day. Maximum 16 h overtime a week.
Forced labour	Farmer A	Farmer A	+2 Yes +1 0 No incidents -1 -2	Follows management plans from the cotton buyer.
	NGO A	NGO A	+2 +1 0 No incidents -1 -2	Not employed under reasonable and documented terms.
	Audit report B	Audit report B	-	Workers are allowed to leave work with reasonable notice. Do not mention incidents.

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	Equal Opportunities	NGO A	+2 +1 0 Incidents -1 Yes -2	Action plan or initiative has been made to prevent discrimination.
		Audit report B	+2 +1 0 No incidents -1 -2	Workers have equal opportunities.
	Health and safety	Farmer A	+2 Yes +1 0 No incidents -1 -2	Follows management plans from the cotton buyer. Best in comparison to others in the field.
	Employment relationship	Farmer A	+2 +1 0 Yes -1 -2	Written contracts exist. Standardised contract.
		NGO A	+2 +1 0 -1 -2 No	Mostly verbal contract.
		Audit report B	+2 +1 0 -1 -2 No	No written agreement, only verbal.
	Sexual harassment	NGO A	+2 +1 0 No incidents -1 -2	No further comment.
		Audit report B	-	Management system in place if incidents occur. No data on incidents.
	Local community	Farmer A	+2 Yes +1 0 No incidents -1 -2	Risk management plans, collaborations with buyers and audit controls.
		NGO A	+2 +1 0 No incidents -1 -2	No further comment.

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	Safe and healthy living conditions	Farmer A	+2 +1 0 No incidents -1 -2	No further comment.
		NGO A	+2 +1 0 No incidents -1 -2	No further comment.
	Local employment	Farmer A	+2 Yes +1 0 100% -1 -2	100% employed locally. Training provided at the field.
		NGO A	+2 +1 0 -1 Mix of local and migrant workers -2	Local or migrant workers.
		Audit report B	+2 +1 0 -1 -2 0%	Migrant workers with Kurdish origin.
Value chain actor	Supplier relationship	Farmer A	+2 Yes +1 0 Respected -1 -2	Collaboration since 1995.

In Table 4.3, a summary of the collected social inventory data for the fabric production is presented. Again, as can be seen in Table 4.3, the different actors have sometimes provided differing answers.

Table 4.3. Social inventory data for the fabric production.

Stakeholder category	Subcategory	Actor in value chain	Indicator result	Comment
Worker	Freedom of association and collective bargaining	Management B	+2 Yes +1 0 No incidents -1 -2	The union is present in discussions and invited to management meetings.
		Worker B	+2 Yes +1 0 No incidents -1	The union is present. Helps in personal issues when needed.

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		-2	
	Audit report C	+2 Yes +1 0 No incidents -1 -2	Meetings with management to improve and discuss issues. Union and 5 union representatives in the facility. Open door policy, worker representatives and suggestion boxes.
	Child labour	Management B +2 +1 0 No incidents -1 -2	No further comment.
		Worker B +2 +1 0 No incidents -1 -2	No further comment.
		Audit report C +2 +1 Yes 0 No incidents -1 -2	Policies and procedures to reduce risk, management training.
	Fair salary	Management B +2 Yes +1 0 Above -1 -2	More than industry standard. Above living wage. Monthly payment and social benefits.
		Worker B +2 Yes +1 0 Above -1 -2	More than industry standard. Above living wage.
		Audit report C +2 Yes +1 0 Below -1 -2	Paid at least minimum wage Lowest Wages found: for contractors 2825,90 TL /month including subsistence allowance (Net). For Unionised employees 3400 TL /month including subsistence allowance (Net).
	Working hours	Management B +2 +1 0 Standard	8 h/day, 6 days a week.

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			-1 -2	
	Worker B	+2 +1 No 0 Standard -1 -2	Compensated overtime. Ability to not work overtime.	
	Audit report C	+2 +1 0 More -1 Yes -2	4 incidents of working hours violating the law. Action plan to increase number of employees	
Forced labour	Management B	+2 +1 0 No incidents -1 -2	No further comment.	
	Worker B	+2 +1 0 No incidents -1 -2	No further comment.	
	Audit report C	+2 +1 Yes 0 No incidents -1 -2	Policies and procedures to reduce risk, management training.	
Equal opportunities	Management B	+2 +1 Yes 0 No incidents -1 -2	Report in the internal system. Ethic email system for complaints.	
	Worker B	+2 +1 Yes 0 No incidents -1 -2	Known channels to report incidents if needed.	
	Audit report C	+2 +1 Yes 0 No incidents -1 -2	Policies and procedures to reduce risk, communicated to workers via poster and annual training.	
Health and safety	Management B	+2 +1 0 Incidents -1 -2 No	Have emergency/preventive protocol but no action plan.	

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		Worker B	+2 +1 0 No incidents -1 -2	Workers at Bossa do not work directly with chemicals.
		Audit report C	+2 +1 0 Incidents -1 -2 No	36 incidents per 100 workers 2020 Management frequently works with OHS specialists and employee representatives to ensure continuous compliance.
	Employment relationship	Management B	+2 +1 No 0 Yes -1 -2	Written contract. No negotiation between employer and employee.
		Worker B	+2 +1 Yes 0 Yes -1 -2	There is a written contract with copies for the worker. The workers negotiate the contract with the help of the union. The contract does not get approved if not everyone agrees.
		Audit report C	+2 +1 0 Yes -1 -2	Written contract, copy for worker.
	Sexual harassment	Management B	+2 +1 0 No incidents -1 -2	No further comment.
		Worker B	+2 +1 0 No incidents -1 -2	N/A - do not want to answer, the management answers the question instead of the worker.
		Audit report C	+2 +1 Yes 0 No incidents -1 -2	Policies and procedures to reduce risk, communicated to workers via poster and annual training.
Local community	Access to material resources	Management B	+2 Yes +1 0 No incidents -1	Collaboration with Adana industrial zone, Universities and committees.

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			-2	
		Worker B	+2 +1 Yes 0 No incidents -1 -2	Control system and test to prevent damage.
		Audit report C	-	N/A
	Safe and healthy living conditions	Management B	+2 Yes +1 0 No incidents -1 -2	Collaboration with Adana industrial zone, Universities and committees.
		Worker B	+2 +1 0 No incidents -1 -2	The factory is in an industrial area. No housing.
		Audit report C	-	N/A
	Local employment	Management B	+2 Yes +1 0 100% -1 -2	Hire local people due to quality, price, and timing. Reduces skill gaps by providing education in facilities.
		Worker B	-	The workers live in the nearest city. Cannot be assessed in the reference scale.
		Audit report C	-	N/A
Value chain actor	Supplier relationship	Management B	+2 +1 Yes 0 Respected -1 -2	Trading terms are respected by both sides. Good collaboration with cotton suppliers. No collaboration with denim receivers for trousers production.
		Worker B	-	N/A
		Audit report C	+2 Yes +1 0 Respected -1 -2	The site encourages its business partners (e.g. suppliers) to provide individuals and communities with access to effective

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				<p>grievance mechanisms (e.g. helplines or whistle blowing mechanism)</p> <p>The facility has a Business Ethics Policy and communicates it via e-mail externally and via announcement boards internally to third parties and suppliers.</p>
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### 4.1.2 Background system

The background system includes the input unit processes to cotton cultivation and fabric production, see Figure 3.2. The input unit processes for the cotton cultivation include the fertilizer supply chain, electricity, and fuel production. The main process flows into these input unit process include rock phosphate, natural gas and crude oil. The input unit processes that are included within fabric production are chemicals, electricity, and fuel production.

#### 4.1.2.1 Activity variable data in background system

Results regarding the activity variable for the input unit processes in the background system are based on general data and further calculations. Table 4.4 shows the calculated worker hour per activity along the life cycle. The calculation shows that natural gas extraction requires most worker hours for cotton cultivation and for fabric production.

Table 4.4. Worker hours in the background system per 1 kg produced fabric.

Activity	Unit process	Worker hours
Cotton cultivation	Natural gas extraction	7.9e-5
	Electricity production	1.1e-5
	Crude oil extraction	0.6e-5
	Fuel production	0.4e-5
Fabric production	Natural gas extraction	300.6e-5
	Electricity production	41e-5
	Chemical production	9.5e-5

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### 4.1.2.2 Data collection on social inventory

In Table 4.5, a summary of the references for the collection of social inventory data for the background system is shown. The geographical origin of the flows is based on data collected from Management B, as well as the amount of the chemicals in fabric production. The amounts for the background systems regarding the cotton cultivation was collected from Textile Exchange (2014). The remaining amounts regarding the fabric production were collected from Åslund Hedman (2018). The unit processes with the comment “Not assessed” have been excluded due to lack of data. Assumptions made for the collected social inventory data are presented together with the unit process assessment in Tables 4.6-4.11.

Table 4.5. Summary of the social inventory data for the background system.

Activity	Unit process	Amount/FU	Unit	Origin	Source
Cotton cultivation	Seed production	0.02	kg	Turkey	N/A Reuse seeds from previous year.
	Water system	6.68	L	Turkey	N/A Use of a nearby natural irrigation system.
	Fertiliser production (Manure)	6.16	kg	Turkey	No complete data El Wali et al. (2021)
	Rock phosphate extraction	0.17	kg	China	No complete data El Wali et al. (2021)
	Power plant for electricity production	0.52	MJ	Turkey	ENKA Social sustainability report 2021
	Natural gas extraction for electricity production	0.03	m <sup>3</sup>	Russia	Gazprom Sustainable Development Report 2020
	Fuel production	0.02	L	Tüpraş Annual report, 2022	
	Crude oil extraction	0.02	L	Iraq	Shell Sustainability report 2014
	Waste management	-	-	-	Not assessed
Fabric production	Water plant / Wastewater treatment plant	-	-	Turkey	Not assessed

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	Starch production	0.11	kg	Turkey	Not assessed
	Polymer emulsion production	0.02	kg	Turkey	Polisan Holdings Sustainability report 2015
	Sequestering agent production	>0.01	kg	Germany	Not assessed
	Dispersing agent production	>0.01	kg	Turkey	Polisan Holdings Sustainability report 2015
	Indigo dye production	>0.01	kg	Germany	Not assessed
	Caustic Sodium Hydroxide production	>0.01	kg	Turkey	Polisan Holdings Sustainability report 2015
	Hydrosulphite production	>0.01	kg	Turkey	Polisan Holdings Sustainability report 2015
	Wetting agent production	>0.01	kg	Germany	Not assessed
	Softening agent production	>0.01	kg	Turkey	Polisan Holdings Sustainability report 2015
	Power plant for electricity production	0.005	MWh	Turkey	ENKA Social sustainability report 2021
	Natural gas extraction for electricity production	1.11	m <sup>3</sup>	Russia	Gazprom Sustainable Development Report 2020
	Heat production	0.91	m <sup>3</sup>	Turkey	Not assessed

### 4.1.2.2.1 Electricity production and natural gas extraction

Electricity is produced in power plants in Turkey, mostly from natural gas (Lane, 2018). Most of the natural gas (34%) comes from Russia (International Trade Administration, 2021). The background information about natural gas produced in Russia was investigated by using reports from Russia's biggest natural gas producing company, Gazprom. The subcategories evaluated for natural gas in Russia, Gazprom's sustainability report from 2020 were considered. A summary of social inventory data can be seen in Table 4.6 (Gazprom, 2021).

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Table 4.6. Data for natural gas extraction.

<b>Origin</b>			Russia	
<b>Worker hours</b>			Producing 497.6 billion cubic metres of natural gas, total of 466,000 employees (Gazprom, 2021)	
<b>Stakeholder category</b>	<b>Subcategory</b>	<b>Source</b>	<b>Indicator result</b>	<b>Comment from report</b>
Worker	Child Labour	(Gazprom, 2021)	+2 Yes +1 0 No incidents -1 -2	No child labour. An extensive social investment program and management program.
	Fair Salary	(Gazprom, 2021) (Minimum-Wage, 2022)	+2 Yes +1 0 Above -1 -2	In 2020, the average monthly salary at Gazprom Neft was up 5% to ₽141,000, and the workers have social benefits. The minimum wage in Russia is 7500 ₽.
	Forced Labour	(Gazprom, 2021)	+2 Yes +1 0 No incidents -1 -2	No forced labour. An extensive social investment program and management program.
	Health and Safety	(Gazprom, 2021)	+2 +1 0 Incidents -1 Yes -2	0 industrial incidents and 75 incidents regarding equipment in 2020. Preventive work and action plans in place.

The electricity production is assumed to be produced from natural gas since it is the biggest share in the Turkish electricity mix and is mainly imported from Russia. For social inventory data collection for electricity, ENKA was used as a reference in the background system. The company ENKA owns a power plant outside Izmir, which accounts for 11% of electricity production in Turkey (ENKA, 2022). The background information about the subcategories can be seen in Table 4.7, where most of the information comes from ENKA's sustainability report from 2020, published in 2022 (ENKA Social Sustainability, 2022).

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Table 4.7. Data for electricity production.

<b>Origin</b>			Turkey	
<b>Worker hours</b>			Data for calculation of worker-hour: 1580 MW, around 350 employees (ENKA, 2022)	
<b>Stakeholder category</b>	<b>Subcategory</b>	<b>Source</b>	<b>Indicator result</b>	<b>Comment from report</b>
Worker	Child Labour	(ENKA - Business, 2020)	+2 Yes +1 0 No incidents -1 -2	No child labour. Engagement in the whole supply chain. Supports education for children in society.
	Fair Salary	(ENKA Social Sustainability, 2022)	+2 Yes +1 0 Below -1 -2	99.9% of ENKA employees earn a salary above the minimum wage. Provide social benefits.
	Forced Labour	(Code of Business Conduct, 2020)	+2 Yes +1 0 No incidents -1 -2	No forced labour. Management system and local society engagement.
	Health and Safety	(ENKA Social Sustainability, 2022) (Suer, 2022)	+2 +1 0 Incidents -1 Yes -2	Incidents have occurred. Action plans in place and preventive work.

### 4.1.2.2.2 Fuel production and crude oil extraction

In Turkey, most of the crude oil imported to produce petroleum products came from Iraq, with 41% in 2015 (EIA, 2017). Majnoon is one of the world's largest oil fields in Iraq, where the oil company Shell operates with a share of 45% of the field. The social inventory data for the subcategories is retrieved from Shell's sustainability report from 2014, see Table 4.8 for a summary. After 2015, most of the big foreign companies in Iraq gave the responsibility to handle the oil field to Iraq Basra Oil and Gas. However, there is no social sustainability data to be found for that company (Iraq Basra Oil & Gas, 2021). Worker hours of the crude oil extraction process in Iraq is based on data from the oil company BP, which operated in the Rumaila oil field in Iraq. In the Rumaila oil field, 7000 people work and produce about 1.5 million barrels/day (Atie, 2019).

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Table 4.8. Data for crude oil extraction.

<b>Origin</b>			Iraq	
<b>Worker hours</b>			Data for calculation of worker-hour: 7,000 people on the field. 1,5 million barrels/day (Atie, 2019)	
<b>Stakeholder category</b>	<b>Subcategory</b>	<b>Source</b>	<b>Indicator result</b>	<b>Comment from report</b>
Worker	Child Labour	(Shell Sustainability, 2014).	+2 Yes +1 0 No incidents -1 -2	No child labour. Management system in place with training and engagement in society.
	Fair Salary	(Shell Sustainability, 2014)	-	According to Shell their salaries reflect the market conditions. However, due to that the sustainability was not country specific no more detailed answer could be found.
	Forced Labour	(Shell Sustainability, 2014)	+2 +1 Yes 0 No incidents -1 -2	No forced labour and a management system in place.
	Health and Safety	(Shell Sustainability, 2014)	+2 +1 0 Incidents -1 Yes -2	Injuries per million working hours (employees and contractors) 0.28 (2014) Action plans in place to prevent further incidents.

The import of crude oil from Iraq is being processed in oil refineries in Turkey. One of those refineries is Tüpraş, Turkey's biggest refinery located outside Izmir (Tüpraş, 2022). Information about worker hours was obtained from Tüpraş: 1448 employees producing 11.9 million tonnes of petroleum products combined (Tüpraş - Refinery, 2022). For evaluation of the subcategories, Tüpraş sustainability report from 2020 (Tüpraş - Sustainability report, 2020) and the annual report from 2021 (Tüpraş - Annual report, 2022) were consulted.

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Table 4.9. Data for fuel production.

<b>Origin</b>			Turkey	
<b>Worker hours</b>			Data for calculation of worker hours: 1,448 personnel are employed in the facility. Production 11,9 million tonnes (Tüpraş - Refinery, 2022)	
<b>Stakeholder category</b>	<b>Subcategory</b>	<b>Source</b>	<b>Indicator result</b>	<b>Comment from report</b>
Worker	Child Labour	(Tüpraş - Sustainability report, 2020)	+2 Yes +1 0 No incidents -1 -2	No child labour. Engagement in society in forms of education to children
	Fair Salary	(Tüpraş - Sustainability report, 2020)	+2 Yes +1 0 -1 -2	According to law and industry standards. Social benefits. No information about above or below living wage.
	Forced Labour	(Tüpraş - Sustainability report, 2020)	+2 Yes +1 0 No incidents -1 -2	No forced labour. Management system and engagement in society
	Health and Safety	(Tüpraş - Annual report, 2022).	+2 +1 0 Incidents -1 Yes -2	Incidents have occurred. Number of Incidents x 200,000/person hour) - 0.75. Action plans in place.

### 4.1.2.2.3. Chemical production for fabric production

The chemicals used in the denim fabric production are bought from a company located in Turkey. However, due to the difficulty to find relevant information about that specific company, data from Polisan Holdings was instead used as proxy. Polisan Holding was established in the year 2000, is located in Turkey and active in 6 different sectors: paint, chemical activities, port operations, textile and agriculture. For the chemicals used in fabric production, the sustainability report from the company Polisan Holding from 2015 was used (Polisan Holding, 2015). The part of Polisan Holding responsible for the textile chemical production is called Polisan Kimya. Results from that part are presented in Table 4.10.

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Table 4.10. Data for chemical production.

<b>Origin</b>			Turkey	
<b>Worker hours</b>			107 employees in blue collar in the company Polisan Kimya. 150000 tonnes/year (Polisan Holding, 2015)	
<b>Stakeholder category</b>	<b>Subcategory</b>	<b>Source</b>	<b>Indicator result</b>	<b>Comment from report</b>
Worker	Child Labour	(Polisan Holding, 2015)	+2 Yes +1 0 No incidents -1 -2	Polisan established 2 schools that provide education for children. Municipality joint projects.
	Fair Salary		-	No data has been found.
	Forced Labour	(Polisan Holding, 2020)	+2 +1 Yes 0 No incidents -1 -2	No forced labour. Engagement in the whole company globally.
	Health and Safety	(Polisan Holding, 2015)	+2 +1 0 Incidents -1 Yes -2	Incidents have occurred. Provides training. Action plan and management system in place.

## 4.2 Impact Assessment results

This section presents the final scoring for all subcategories for specific activities and the whole system assessed. The section also presents diagrams visualizing a hotspot analysis.

### 4.2.1 Scoring of foreground system: Cotton cultivation

In Table 4.11, the scoring of the cotton cultivation activity is presented. The table presents scoring of the subcategories from three value chain actors in cotton cultivation. The different scorings are tested in a sensitivity analysis, see Section 4.3.1. However, the results show a higher score from Farmer A in most of the subcategories and no scores lower than 0 have been given by that actor. NGO A and Audit report B give lower scores than 0 in many of the subcategories compared to Farmer A. The value chain actor in bold represents the choice of actor who is considered in the base scenario. The base scenario is modeled in the hotspot analysis in Section 4.2.4.

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Table 4.11. Scoring of the cotton cultivation activity. Value chain actors in bold represents the score used for the base scenario.

Subcategory	Value chain actor	Score
Freedom of association and collective bargaining	<b>Farmer A</b>	+1
Child labour	<b>Farmer A</b>	+1
	NGO A	-1
	Audit report B	0
Fair salary	<b>Farmer A</b>	+2
	NGO A	-1
	Audit report B	-2
Working hours	<b>Farmer A</b>	0
	NGO A	-2
	Audit report B	0
Forced labour	<b>Farmer A</b>	+2
	NGO A	0
Equal opportunities	NGO A	-1
	Audit report B	0
Health and safety	<b>Farmer A</b>	+2
Employment relationship	<b>Farmer A</b>	0
	NGO A	-2
	Audit report B	-2
Sexual harassment	NGO A	0
Access to material resource	<b>Farmer A</b>	+2
	NGO A	0
Safe and healthy living conditions	<b>Farmer A</b>	0
	NGO A	0
Local employment	<b>Farmer A</b>	+2
	NGO A	-1
	Audit report B	-2
Supplier relationship	<b>Farmer A</b>	+2

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### 4.2.2 Scoring of foreground system: Fabric production

In Table 4.12, the scoring for the three actors in fabric production activity can be seen. The table shows that the value chain actors do not get a similar scoring for many of the subcategories, which indicates that there is a need for a sensitivity analysis. However, the results show mainly positive scores, except for Audit report C in the Health and safety subcategory. The value chain actor in bold represents the choice of actor who is considered in the base scenario. The base scenario is considered in the hotspot analysis in Section 4.2.4.

Table 4.12. Scoring of the fabric production activity. Value chain actors in bold represents the score used for the base scenario.

Subcategory	Value chain actor	Score
Freedom of association and collective bargaining	<b>Management B</b>	+2
	Worker B	+2
	Audit report C	+2
Child labour	<b>Management B</b>	0
	Worker B	0
	Audit report C	+1
Fair salary	<b>Management B</b>	+2
	Worker B	+2
	Audit report C	-1
Working hours	<b>Management B</b>	0
	Worker B	0
	Audit report C	-1
Forced labour	<b>Management B</b>	0
	Worker B	0
	Audit report C	+1
Equal opportunities	<b>Management B</b>	+1
	Worker B	+1
	Audit report C	+1
Health and safety	<b>Management B</b>	-2
	Worker B	0
	Audit report C	-2

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Employment relationship	<b>Management B</b>	0
	Worker B	+1
	Audit report C	0
Sexual harassment	<b>Management B</b>	0
	Worker B	0
	Audit report C	+1
Access to material resources	<b>Management B</b>	+2
	Worker B	+1
Safe and healthy living conditions	<b>Management B</b>	+2
	Worker B	0
Local employment	<b>Management B</b>	+2
Supplier relationship	<b>Management B</b>	+1
	Audit report C	+2

### 4.2.3 Scoring of background system

In Table 4.13, the scoring of all included background unit processes for the activities cotton cultivation and fabric production is presented.

Table 4.13. Scoring of the background system.

Natural gas extraction	Score
Child labour	+2
Fair salary	+2
Forced labour	+2
Health and safety	-1
Power plant for electricity production	Score
Child labour	+2
Fair salary	-1
Forced labour	+2
Health and safety	-1
Crude oil extraction	Score
Child labour	+2

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Forced labour	+1
Health and safety	-1
<b>Fuel production</b>	<b>Score</b>
Child labour	+2
Forced labour	+2
Health and safety	-1
<b>Chemical production</b>	<b>Score</b>
Child labour	+2
Forced labour	+1
Health and safety	-1

### 4.2.4 Product system

A base scenario is constructed for the hotspot analysis. The base scenario is based on Farmer A and Management B for the foreground system. The background system did not attain data from different value chain actors for the same unit process, hence an average score is used. The average score is based on the scores complementary to each subcategory from all five background unit processes. When comparing the foreground and background systems, only Child Labour, Fair Salary, Forced Labour and Health and Safety is compared. When looking only on the foreground system, all 13 subcategories is compared. High bars in the diagram indicate high scores that translates into low, or no, risks for potential social impacts, while lower or downfacing bars indicate lower scores and therefore higher risks for potential social impacts.

A comparison of the four subcategories evaluated for the whole product system are presented in Figure 4.1. The figure presents the score for each activity multiplied with the specific worker hours for that activity to address the share of the potential social impacts for each subcategory. The foreground system of cotton cultivation has the highest number of worker hours, as can be seen in Table 4.1, and therefore effects the results of the potential social impacts for the main four subcategories the most. The background system has comparatively few worker hours, and therefore constitutes a minor share of the potential social impacts. The three subcategories Fair salary, Forced labour, and Health and safety show similar low risk for potential social impacts. This is due to the low incidence of these three subcategories reported in both the foreground and background systems. Even though the subcategory Health and safety show negative scores for the fabric production in the fore- and background system, the subcategory Child labour is still significantly lower in total. This indicates the highest risk for potential social impacts associated with the subcategory Child labour for the whole product system. However, the outcome is still up facing, indicating low risks for potential social impacts.

## 4. Results

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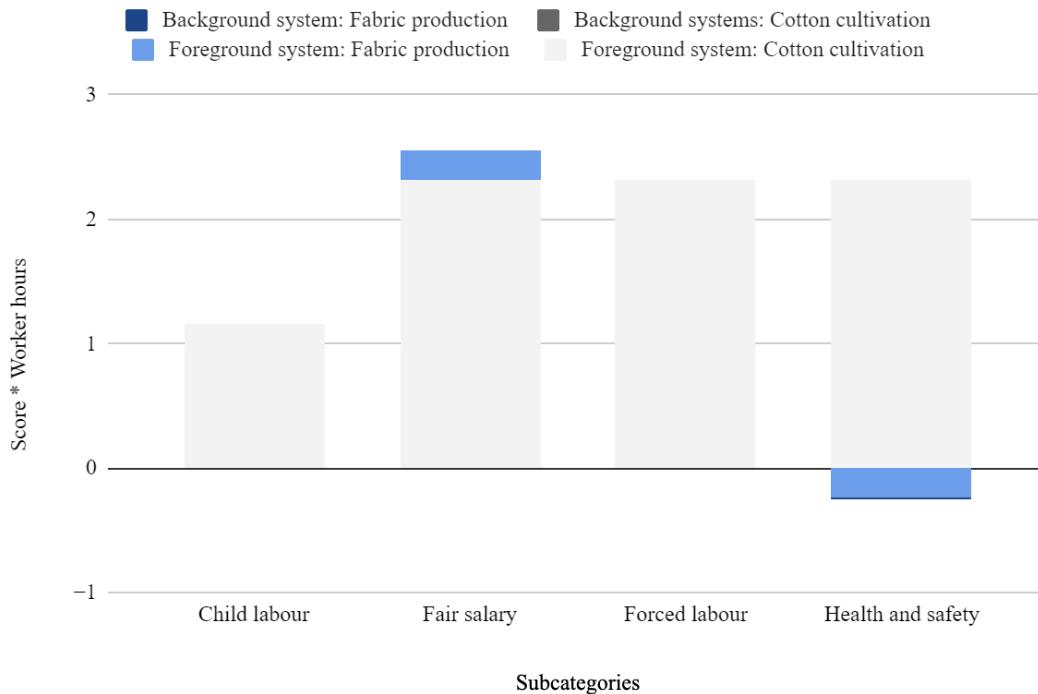


Figure 4.1. Risk for potential social impacts of for the four subcategories covered throughout the whole value chain.

Figure 4.2 shows the base scenario scores for each subcategory of the cotton cultivation and fabric production in the foreground system, i.e. results without considering the activity variable worker hours. The results show that Health and safety has the highest risk for potential social impacts in the foreground activities. However, when the number of worker hours is considered, this contribution becomes notably reduced compared to those from cotton cultivation, as can be seen in Figure 4.1.

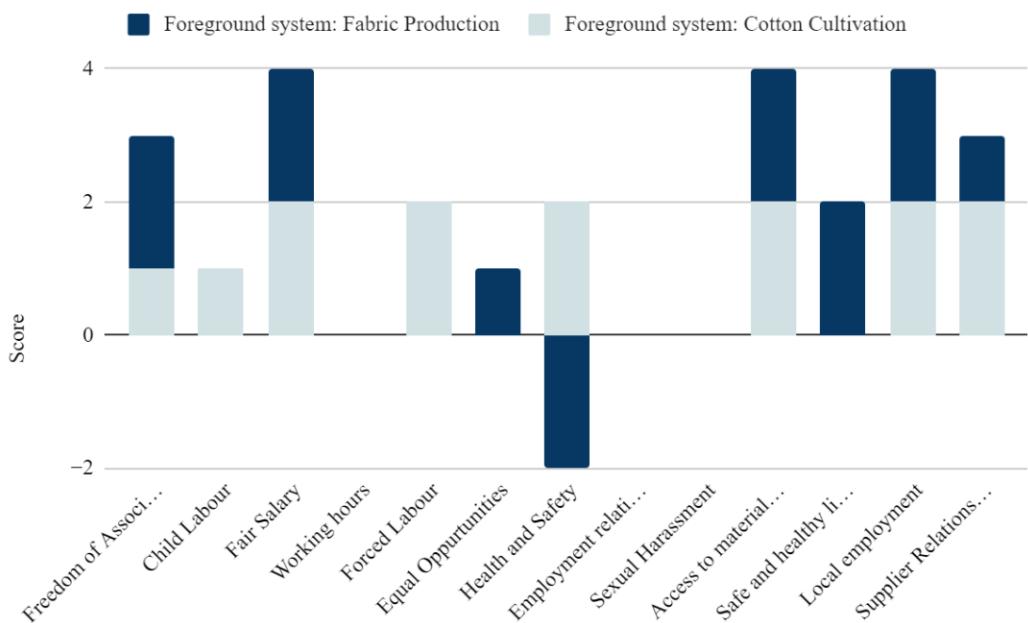


Figure 4.2. Foreground system scoring in base scenario.

#### 4. Results

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Figure 4.3 shows the potential social impacts of the subcategories in the cotton cultivation activity in the foreground system, which was obtained by combining the worker hours from Table 4.1 and the scoring from Table 4.14. As can be seen, it is the harvesting unit process that has the highest risk of potential social impact. Potential social impacts from ginning are not detectable in Figure 4.3, due to low worker hours. The subcategories with the highest risk of potential social impacts are Working hours, Employment relationship and Safe and healthy living conditions. These subcategories have the lowest total scores, which translates to the highest risk of potential social impacts in the cotton cultivation activity. However, while lowest, they still show the value 0, which means a generally acceptable situation.

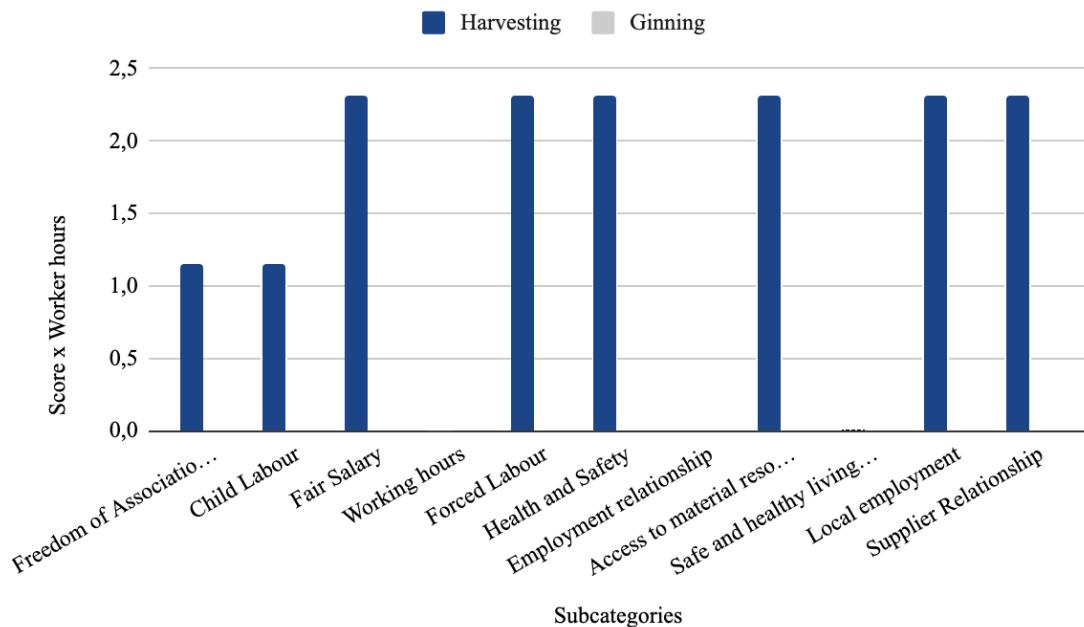


Figure 4.3. Potential social impacts of each unit process in the cotton cultivation activity.

Figure 4.4 shows the potential impacts of the subcategories in the fabric production activity in the foreground system, which was obtained by combining the worker hours from Table 4.1 and the scoring from Table 4.13. The subcategories that have the highest potential social impacts here is clearly Health and safety, followed by Working hours, Forced labour, Employment relationships and Sexual harassment. Here, the Health and safety subcategory actually shows negative results, which means that the situation is unacceptable. The unit processes weaving and spinning and warping are the processes the are mostly impacted by the risks for potential social impacts.

## 4. Results

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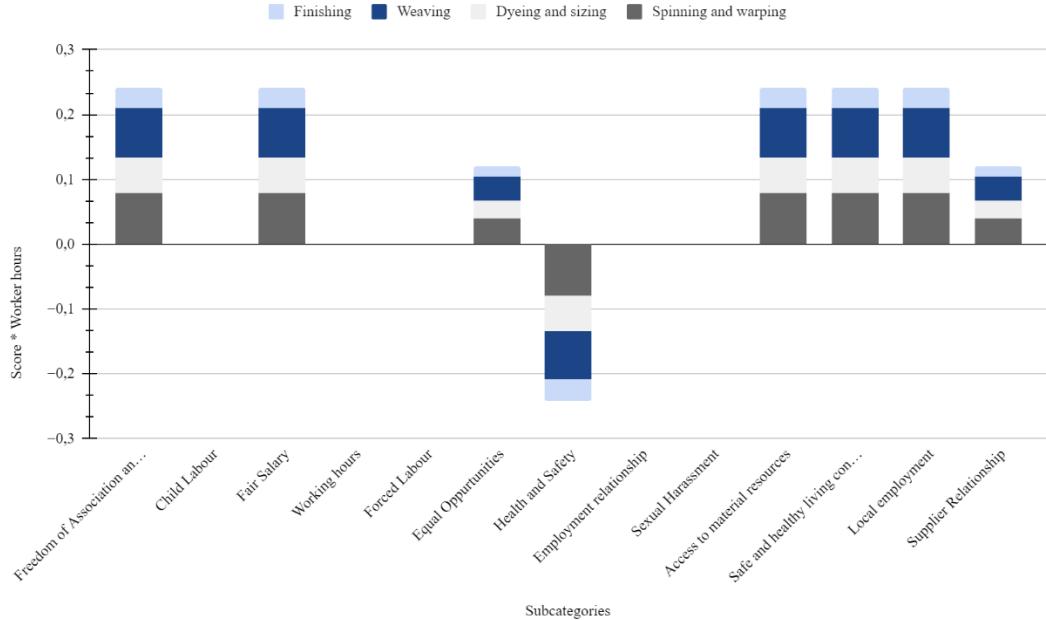


Figure 4.4. Potential social impact in the fabric production activity.

### 4.3 Interpretation results

This section presents a sensitivity analysis of a worst-case scenario. The worst-case scenario is based on the lowest scores attained from the Tables 4.12 and 4.13 for the foreground systems activated multiplied with the associated worker hours. Since the background system did not attain data from different value chain actors, the sum of the score multiplied with worker hour for each unit process was used to simulate the activities cotton cultivation and fabric production of the background system. When comparing the foreground and background systems, only Child Labour, Fair Salary, Forced Labour and Health and Safety is compared. When looking into the foreground system, all 13 subcategories is compared. High bars in the diagram indicate high scores that translates into low potential social impacts, while lower or downfacing bars indicate lower scores and therefore higher potential social impacts.

#### 4.3.1 Sensitivity analysis

Figure 4.5 show the worst-case score for each activity in the whole product system multiplied with the specific worker hours. The cotton cultivation in the foreground system has the highest number of worker hours, as can be seen in Table 4.1, and therefore effects the outcome of the risks for potential social impacts for the main four subcategories the most. Due to that the background systems activities only have one scoring for each unit process, their results have not changed from Figure 4.1. The results of the worst-case differ significantly from the base scenario regarding the foreground system. The subcategories Child labour and Fair salary showed negative scores, although they received positive scores in the base scenario. Forced labour decreased its score from positive to 0. Only the subcategory Health and Safety remained the same as in base scenario.

## 4. Results

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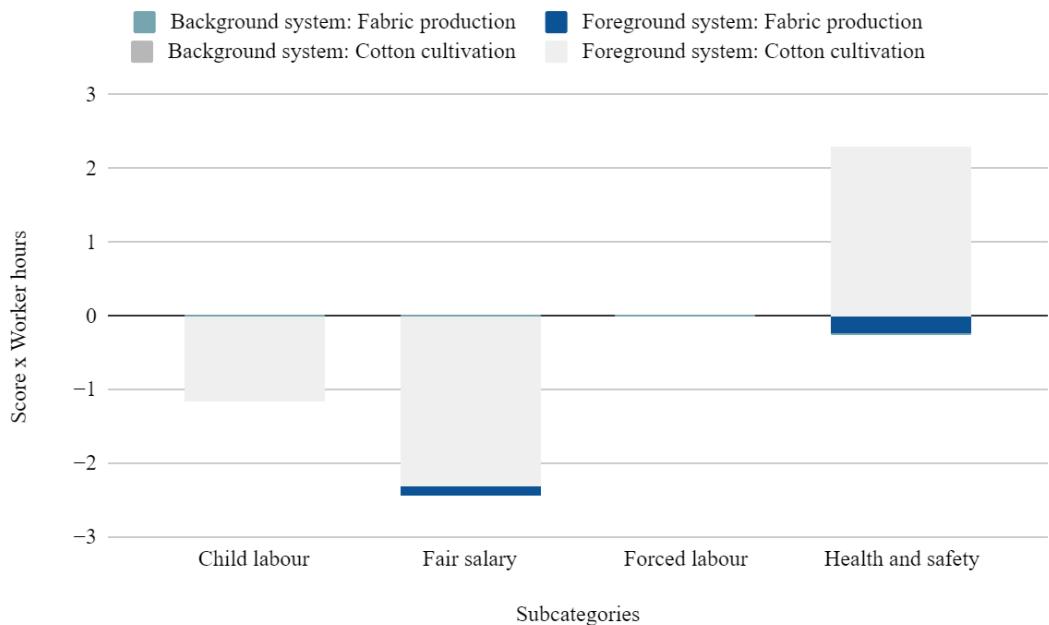


Figure 4.5. Worst-case potential social impacts of the activities in the value chain.

Figure 4.6 shows the worst case scores for each subcategory of the cotton cultivation and fabric production in the foreground system, i.e. results without considering the activity variable worker hours. The results show that Fair salary and Working hours have the highest risk for potential social impacts in a worst-case scenario, and several other subcategories show negative scores. This is notably different from the base scenario, which did not show negative scores on any subcategory.

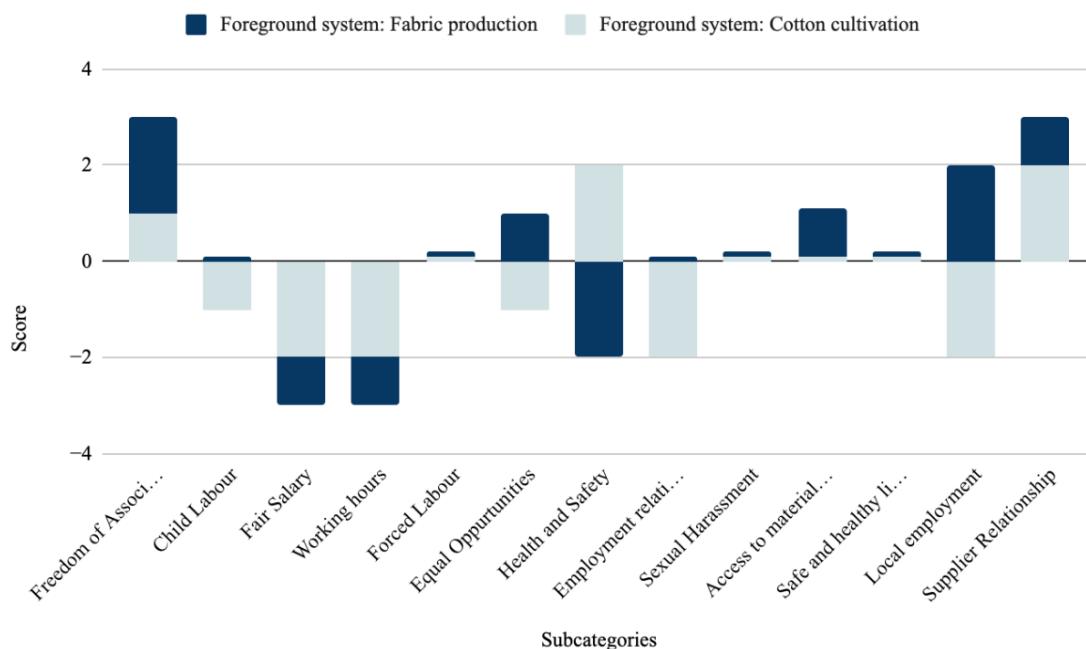


Figure 4.6. Foreground system scoring in the worst-case scenario.

Figure 4.7 shows the worst-case potential social impacts of the subcategories in the cotton cultivation activity of the foreground system, which were obtained by combining the worker hours from Table 4.1 and the scoring from Table 4.14. As can be seen, the

## 4. Results

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harvesting unit process has the highest worst-case potential social impacts. Potential social impacts from ginning are not detectable in Figure 4.7 due to low worker hours. Compared to the base scenario, which did not show any high potential social impact for any of the subcategories, the highest potential social impacts for the worst-case scenario are Fair salary, Working hours, Employment relationship and Local employment.

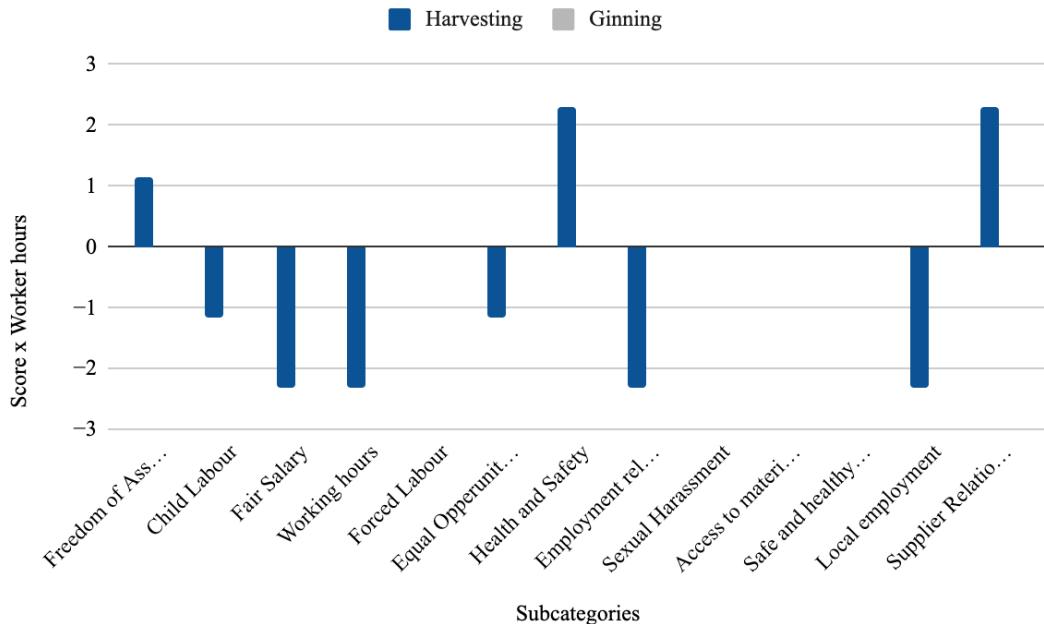


Figure 4.7. Worst-case potential social impact of each unit process in the cotton cultivation activity.

Figure 4.8 shows the potential social impacts of the subcategories in the fabric production activity in the foreground system, which were obtained by combining the worker hours from Table 4.1 and the scoring from Table 4.13. The subcategory that has the highest worst-case potential social impact is Health and safety, and the unit processes spinning and wraping as well as weaving have the largest share of potential social impacts. The result of the worst-case scenario also show that Fair salary and Working hours have negative scores, which is contrary to the base scenario.

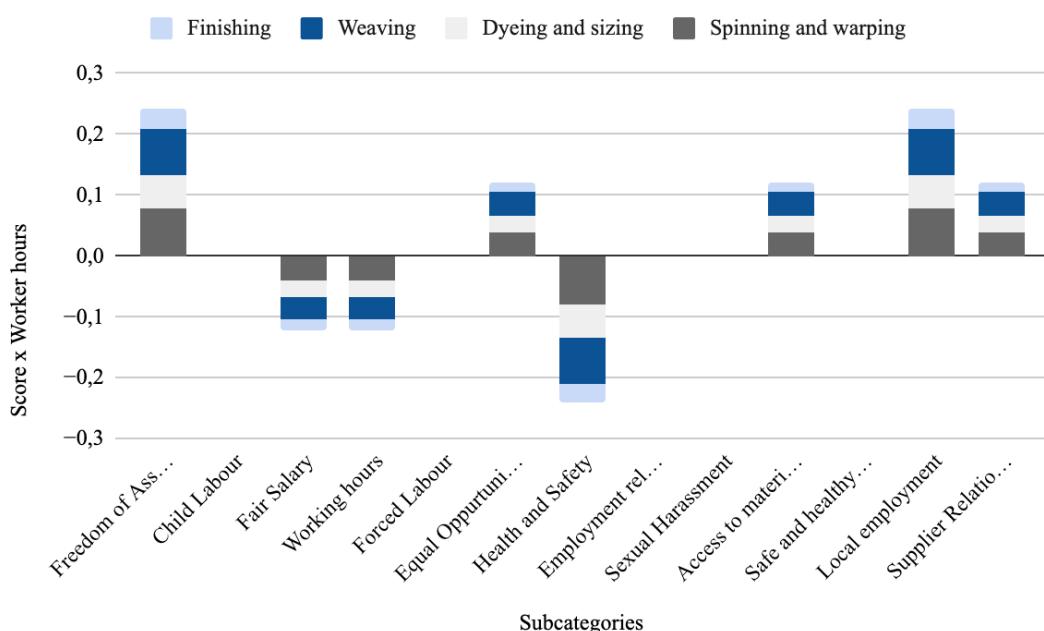


Figure 4.8. Worst-case potential social impact of each unit process in the fabric production activity.

# 5

# Discussion

This SLCA provides different answers to the research question “What are the risks for potential social impacts associated with the value chain of denim fabric from an organic cotton plantation in Turkey?” When comparing the results regarding the whole product system, only the four subcategories Child labour, Fair salary, Forced labour and Health and safety are considered. However, when comparing the results from the foreground system, all 13 subcategories are considered.

According to the base scenario results and the whole product system, no risks for potential social impacts are identified. The lowest score in the whole product system is +1 and is associated with the subcategory Child labour. The score indicates that all actors in the value chain has a management system in place, but no identification of high engagement could be made, which would be required for Child labour to obtain the highest score. Large number of worker hours in cotton cultivation has the biggest influence on the end results. The background system shows minor risks for potential social impacts compared to the foreground system regarding the four subcategories.

Without taking the worker hours and background system into account, the risks for potential social impacts in the whole product system are associated with the subcategory of Health and safety. The subcategory received a score of -2 in the base scenario. Based on the reference scale and its indicators, the score indicates that the organisation responsible for the activity and subcategory, in this case the fabric production and Health and safety, has failed to take actions against the incidents that have occurred at site. Looking into the unit processes in the fabric production activity, the result presents spinning and warping, and weaving as the processes where workers are impacted the most by the failed actions.

The worst-case scenario showed that there exists a risk for potential social impacts in the foreground system processes for cotton cultivation and fabric production. The risks for potential social impacts are associated with the subcategories Child labour, Fair salary and Health and safety. The subcategory Health and safety is still connected to the fabric production, but the subcategories Fair salary and Child labour are connected to cotton cultivation. According to the worst-case scenario and amongst the unit processes for cotton cultivation, harvesting is the process that, according to the results, is the most impacted by the organisational behaviour, i.e., not taking action towards incidents that have occurred. For fabric production, the most contributing unit processes in the worst-case scenario are spinning, warping, and weaving.

The sensitivity analysis shows that due to differences in the empirical input data, the answer to the research question is highly dependent and sensitive to which value chain actor the result is based on. Comparing the foreground system social inventory data for all 13 subcategories, in the base and worst-case scenarios, several other potential social impacts were identified. The identified subcategories besides those already mentioned were: Working hours, Equal opportunities, Employment relationships and Local

## 5. Discussion

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employment for the cotton cultivation activity. For the fabric production activity, risk for potential social impacts was additionally found for Working hours.

Since the worst-case scenario is modelled with scorings based on NGO A, it is important to mention that NGO A might include information and grievances from other organizations, albeit specific for the Söke region where the cultivation in this study takes place. For future SLCA studies, it would be of interest to have the specific grievances from the cotton fields of the studied value chain to ensure that the results are specific to the studied product. This is one of the reasons for why Farmer A was instead chosen as primary data source for the base scenario.

It should be noted that this result is based on worker hours as the activity variable. Different results might have been obtained if the activity variable was instead based on monetary value. A problem with the assessed scope for the product system is that it fails to consider the activities between the unit processes. As observed in fabric production, it is in between processes that most manual labour occurs. An example of this is the moving of materials from one workstation to another. To assess these steps, extensive data collection would also be needed for these in-between steps. Theoretically, these steps could be merged with either the unit process before or after.

In addition, since social inventory data was collected for all 13 subcategories in the site-specific research, more risks of potential social impacts could be detected in the foreground system compared to the background system, which only contained four subcategories in this study. However, according to the results, the contributions from the background system to the potential social impacts for these four subcategories are minor due to few worker hours. This would likely have been the case also for additional subcategories, so including more subcategories in the background system would thus probably not have influenced the results considerably.

The number of included subcategories and specific indicators for the reference scale are considered too many for the time needed for the interviews. The numerous subcategories were sometimes difficult to differentiate for the participants in the interviews, since they had no prior knowledge of these subjects. For example, the subcategories Access to material resources and Safe and healthy living conditions needed a detailed explanation for the participants to be able to differentiate between them. For different reasons, some subcategories were also more difficult than others to obtain reliable answers about from the interviews. One example is the subcategory Sexual harassment, where a reluctance to answer the question was noticeable due to the topic's sensitivity. For the subcategories Working hours and Fair salary, questions were in most cases simply answered with the sentence "according to industry standard". Therefore, it was difficult to assess whether the companies had any further engagement related to these subcategories.

The interviews in Turkey with Farmer A and Worker B were held with men of similar age. However, according to audit reports and observations made at the visits, there are also women and people of different ages working in the value chain. This implies that there is a need for a more extensive diversity in future studies regarding the interviewed participants to evaluate if this could affect the results. The interviews would also benefit from being conducted without management present for translation. This could increase the reliability of the answers, and the participants in the interviews might not feel the pressure to answer in a certain way to avoid subsequent consequences.

## 5. Discussion

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For many subcategories, the reference scale was easy to interpret and find suitable indicators. However, for some subcategories, it was not as simple to construct indicators from the references scale. For example, for Fair salary, a score 0 was given to salaries that matched the living wage. Then the question about how to define higher and lower scores arose, e.g. what amount of money should be scored +1 and what should be scored +2. The solution was that more than one indicator was used to be able to identify which score the subcategory should be given.

It was clear that the reference scales are made to evaluate companies from a global and generic perspective, since they do not consider country-specific or industry-specific aspects. Therefore, modifications of some reference scales connected to the subcategories were made to make them fit this study's goal and scope.

When examining the indicators from PRé's handbook, it was clear that for the subcategories to be scored +2, they had to have an expensive engagement in the issue. Often, it was not enough for the company to work internally with the question, but they had to be engaged in the local society or be the best in class in working with the issue. Since this study considers small-scale farmers and one larger company, it was hard for smaller companies to reach the same high scores. For natural reasons, individual small-scale farmers have limited possibilities to engage extensively in e.g. reduction of sexual harassment and child labour in the local community.

A final remark can be made regarding challenges with the specific score 0, which is present in the middle of the reference scale applied in the study. Since any value multiplied by 0 also becomes 0, results from activities with such a score also become 0, even if they contain a large amount of worker hours. Such a result can be presented as either simply the value 0 in a table, or as a zero-value bar in a bar diagram, which might be interpreted as lack of data or exclusion of the subcategory in question. Alternatively, such results might be overlooked, since many readers probably focus on high and low values in tables, or on high and low bars in diagrams. Further investigations and discussions on how to present zero-value results are therefore recommended.

# 6

# Conclusions

The results for the whole product system show no risks for potential social impacts, meaning no incidents had occurred. The score indicated that there is existing management system in place by the organisations involved in the study. For the subcategory Child labour, no extensive engagement could be identified, therefore receiving the lowest score (+1) in the whole product system. The subcategory Fair salary received the highest score since several organisations responsible for the activities worked with the social issue to a larger extent than the other subcategories. For the cotton cultivation activity, the harvesting requires the most worker hours, with the subcategories Working hours, Employment relationship and Safe and healthy living conditions having the highest risk of potential social impacts. For fabric production, Fair salary, Working hours, and Health and safety had the highest risk of potential social impacts.

The sensitivity analysis shows that future studies might benefit from looking closer into the differences in scores connected to subcategories and the choice of actor. This might include increased knowledge about the persons being interviewed and their underlying motivations. It might also be relevant to reevaluate the reference scale used for evaluating the categories and consider a reference scale without the score 0 due to challenges in visualizing zero-value results.

One final recommendation for further research is to choose a smaller number of subcategories to evaluate rather than a large number. With a smaller number of subcategories, the likelihood of obtaining relevant results during interviews might increase, based on the experiences from this study.

# 7

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# A

# Appendix

## A.1 Interviews of all actors

In Appendix A.1, a general example of the interview questions asked to all actors involved are shown. In Section 1, the actor-specific questions asked to give a better understanding of the actor and to gain information about facts needed for the project can be seen. Before each interview started, a presentation was conducted to clarify and explain the subcategories to make the sections and questions more understandable for the participant.

### **Addressing Social Sustainability along a Product's Life Cycle**

Thank you for taking part in our research on social sustainability. Your response will be part of a research project that intends to address the social impact along the life cycle of an organic denim trousers.

The questionnaire has 14 sections, all addressing different social topics. The first section is general questions. Section 2-10 is coupled to the workers. Section 11-13 is coupled to the local community. Section 14 is coupled to the Turkish textile industry.

Lastly, if you do not wish the company name to be published in the final report of this research, please let us know in the additional comments section at the end of this form.

Once again, thank you very much for your participation. Your input is the most valuable factor of this research.

#### **Section 1. General information - Management B**

1. What is/are the end product(s) produced by the company?
2. What is the production volume per year/month of the end-product(s) mentioned above?
3. What is the current number of workers that the company has?
4. On average, how many hours per week does a full-time employee work at the company?
5. On average, what is the cost of the main raw material used by the company? (USD or EUR/unit)
6. What is the selling price of the end-product produced by the company? (USD or EUR/unit)

#### **Section 1. General information - Farmer A**

- 1.1 In the high season, what does a typical day look like for you?
- 1.2 Did you work with conventional or organic cotton?

- 1.3 Do you own your farm? Who owns the farms/farm? In what area/province is it located?
- 1.4 Are you a part of any farmer organization?
- 1.5 What is/are the end product(s) produced by the company?
- 1.6 How do you gain influence in trading relationships?
- 1.7 How does it work when you buy seeds and fertilizer? Where does it come from?
- 1.8 Where does the electricity that you use come from?
- 1.9 What fuel does the machinery run on?
- 1.10 Who is in charge of employment in the field?
- 1.11 How many workers work on your farm during harvest?
- 1.12 Number of employees, fulltime, part time and seasonal workers? Are the seasonal workers migrant workers or local workers?
- 1.13 If migrant workers: How do you communicate with them if they don't know the local language?

### **Section 1. General information - NGO A (Cotton cultivation)**

1.1 Will your answers consider workers, local community and supplier relationships connected to Nudie Jeans denim value chain?

1.2 Do farmers own their own farm? If not, Who owns the farms/farm?

1.3 Are farmers part of any farmer organisation?

1.4 How do farmers gain influence in trading relationships?

1.5 How does it work when farmers purchase seeds and fertilisers? Where does it come from?

1.6 Where does the electricity come from to the ginning and farms?

1.7 What fuel does the machinery on the farm run on?

1.8 Who is in charge of employment in the field?

1.9 How many workers in total are employed to work during harvest in Turkey?

1.10 If migrant workers: How do they communicate, if the employer does not know the local language?

#### **1.11 STAKEHOLDER: WORKERS**

If you have specific knowledge on the actors from Nudie Jeans Supply Chain, please answer alike.

If not, please answer in general for Organic Cotton Cultivation.

- Workers in the Nudie Jeans Supply Chain
- General answers

#### **1.12 STAKEHOLDER: LOCAL COMMUNITY**

If you have specific knowledge on the Söke/Aegean Region.

If not, please answer in general for Organic Cotton Cultivation.

- Söke/Aegean
- General

#### **1.13 STAKEHOLDER: SUPPLIER RELATIONSHIPS**

If you have specific knowledge on the actors from Nudie Jeans Supply Chain, please answer alike.

If not, please answer in general for actors in the Organic Cotton Cultivation cluster.

- Specific
- General

## **Section 1. General information - NGO A (Material production)**

1.1 What is your work position?

1.2 Will your answers consider workers, local community and supplier relationships connected to Nudie Jeans denim value chain?

1.3 How do fabric manufacturers gain influence in trading relationships?

1.4 How does it work when manufacturers purchase chemicals/additives? Where does it come from?

1.5 Where does the electricity come from in the denim factory?

1.6 If migrant workers: How do they communicate, if the employer does not know the local language?

### **1.7 STAKEHOLDER: WORKERS**

If you have specific knowledge on the actors from Nudie Jeans Supply Chain, please answer alike.

If not, please answer in general for Denim Fabric Manufacturing.

- Workers in the Nudie Jeans Supply Chain
- General answers

### **1.8 STAKEHOLDER: LOCAL COMMUNITY**

If you have specific knowledge on the Adana region.

If not, please answer in general for Denim Fabric Manufacturing.

- Adana
- General

### **1.9 STAKEHOLDER: SUPPLIER RELATIONSHIPS**

If you have specific knowledge on the actors from Nudie Jeans Supply Chain, please answer alike.

If not, please answer in general for actors in the Denim Fabric Manufacturing.

- Specific according Nudie Jeans Supply Chain
- General answers

## **Section 2. Free association and collective bargaining**

2.1. Are you aware of any association or committee formed by the workers at the company?

Yes

No

2.2. Do the workers/Do you have the right to freedom of association and collective bargaining?

Yes

No

2.3. Has there been any incidents regarding violations of the rights to freedom of association and collective bargaining?

Yes

No

2.4. If Yes on 2.3:

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Are you aware if any action was taken and a plan or initiative has been made to address the issue?

Yes

No

2.5. Is the workers association's/committee's representative invited to participate in the company's decisions?

Yes

No

If No on 2.3:

2.4 What is the level of engagement with the union?

### **Section 3. Child Labor**

3.1. Has the company ever hired any young worker (under the age of 15 years old)?

If yes, is he/she attending school at the same time?

Yes and attending school

Yes but not attending school

No

3.2. If Yes on 3.1:

Has any action plan or initiative been made to address the issue?

Yes

No

3.3. If No on 3.1:

Could you please describe any management system in place to prevent illegal child employment? Do you raise awareness about the issues in any way? Is it a top priority?

### **Section 4. Fair Salary**

4.1. What is the lowest wage paid at the company? (local currency/month)

4.2. What is the average wage paid at the company? (local currency/month)

4.3 How do you/they get paid and from who? Ex. monthly or yearly?

4.4. How often do employees receive their wage payment?

4.5. Do you/ the workers receive social benefits?

Yes

No

4.6. If Yes on 4.5: What are the social benefits?

4.7. If No on 4.5: Is there any initiative to introduce social benefits?

**Section 5. Working hours**

5.1. How many hours do the workers/do you work per day?

5.2. How many days off per week?

5.3. In average, what are the current overtime hours/how many overtime hours do you work at the company in the most intense seasons? (hours/week or month)

5.4. Are the workers compensated for overtime? Are these overtime hours paid higher? If yes, how much higher?

5.5. Have there been any incidents of violating the contracted working hour agreement?

Yes

No

5.6. If Yes on question 5.5:

Has any action plan been made to prevent incidents?

Yes

No

5.7. If No on question 5.5:

Is it allowed/are you allowed to have flexible working hours and allowed to leave when needed?

5.9. Does the company/do you know if the company has a management system in place that prevents heavy workload (over-time) during intense periods?

**Section 6. Forced labor**

6.1. Are the workers/are you employed under reasonable and documented terms?

Yes

No

6.2. If No on 6.1

Please explain why not.

6.3. Have you ever noticed/heard of any non-voluntarily/forced job by any of the workers at the company?

Yes

No

6.4 If Yes on question 6.3:

Has any action plan been made to prevent incidents?

Yes

No

6.5 If No on question 6.3: (to Management and NGO)

Is there a management system in place that prevents forced labour in the supply chain?

Do you raise awareness about the issues in any way? Is it a top priority?

6.6 If No on question 6.3:

Are workers/are you able to terminate their contract under the established limits? If not, can you describe the reasons behind this regulation?

### **Section 7. Equal Opportunities**

7.1. Have there been any incidents of discrimination?

Yes

No

7.2. If Yes on 7.1:

Has any action plan/initiative been made to prevent incidents? Do you have any record of if?

Yes

No

7.3. If No on 7.1:

Do you raise awareness about the issues in any way? Is it a key priority?

Is there a management system in place that prevents discrimination and for workers to speak up?

Example:

1. Training/education programs and events to raise awareness,
2. Employee committees to address certain issues,
3. Speak-Up Line,
4. Commitments from tier 1 suppliers

Yes

No

### **Section 8. Health and Safety**

8.1. Can you indicate the number of work-related accidents that occurred at the facility in the last three years? Can you describe the type of accidents?

8.2. If incidents according to 8.1:

Has any action plan/initiative been made to prevent incidents?

Yes

No

8.3. If no incidents according to 8.1: (to Management)

Is there a management system in place regarding OHS?

Do you know in comparison to others in the same industry how good your OHS work is?

8.4. In case a job requires handling chemicals, does the company have/do you know if the company has an emergency/preventive protocol?

Yes

No

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8.5. Does the company provide protective clothes and accessories to employees performing risk labors?

Yes

No

### **Section 9. Employment relationship**

9.1. Is there any difference between full-time, part-time or seasonal workers and presence of a formal contract?

Yes

No

If yes please elaborate:

9.2. Is there a written contract between the employer and worker/you?

Yes

No

9.3. Do the workers/do you have a copy of the contract?

Yes

No

9.4. If Yes on 9.2:

Is there room for negotiation when the contract is agreed upon between employer and worker?

Yes

No

9.5. If No:

Is there/do you have a verbal contract?

Yes

No

### **Section 10. Sexuall harassment**

10.1. Have there been any incidents of sexuall harassment?

Yes

No

10.2. If Yes:

Has any action plan been made to prevent incidents?

Yes

No

10.3. If No:

Do you raise awareness about the issues in any way? Is it a key priority?

Is there a management system in place that prevents sexuall harassment and for workers to speak up?

Example:

1. Training/education programs and events to raise awareness,

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2. Employee committees to address certain issues,
3. Speak-Up Line,
4. Commitments from tier 1 suppliers

### **Section 11. Access to material resources**

11.1. Do you know of any cases where the cotton farm has affected the nearby material resources?

Yes

No

11.2. If Yes:

Has any action plan been made to prevent damage to society's access to material resources?

Yes

No

11.3. If No:

Do you raise awareness about the issues in any way? Is it a top priority?

Is there a management system in place?

### **Section 12. Safe and healthy living conditions (for community)**

12.1. Do you know of any cases where the cotton farm has affected the nearby community, making the living conditions unsafe?

Yes

No

12.2. If Yes:

Has any action plan/initiative been made to prevent damage to society's healthy and safe living conditions?

Yes

No

12.3. If No:

Do you raise awareness about the issues in any way? Is it a high priority?

Are you engaged in any public initiatives regarding the topic?

Is there a management system in place?

### **Section 13. Local employment**

13.1. Do you hire local people?

Yes

No

13.2 If Yes on 13.1:

Is it due to the:

Business criteria like quality, price and timing

Business criteria to stimulate local employment

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Both

13.3 If No:

Do you have any plan or initiatives in supporting the economic growth for the local society?

Yes

No

13.4. Do Management A/Management B actively invest in the local community to enhance economic development?

13.5. Do you see any skill gap when hiring new workers?

13.6. Do you engage in minimizing that skill gap? (including for future generations)

### **Section 14. Supplier relationship**

14.1. Are the contracted trading terms respected?

Yes

No

14.2. If Yes on 14.1:

Do you have any examples of a long term relationship and a successful collaboration?

Have initiatives for more progress been put in place?

14.3. If No on 14.1:

Has a corrective action plan been made after breaking the contracted trading terms?

# B

## Appendix

### B.1 Reference scales

Table B1 to Table B13 present the reference scale used to score the answers from the interviews conducted with all stakeholders.

Table B1. Reference scale for Freedom of association and collective bargaining.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The company or facility engages in a dialogue with the collective representation of workers and incorporates their views into management decisions in a structured and well-defined manner.
1	The company informs workers of decisions that could affect their position, before they are taken and recognises and listens to the collective representation of organised workers in negotiations when they provide feedback.
0	No incidents have been discovered that the company or facility prevents workers freedom of association and collective bargaining.
-1	Incidents have been discovered that show that the company or facility prevents workers' rights to freedom of association and collective bargaining, but a corrective action plan with a clear timeline for completion has been developed.
-2	Incidents have been discovered, that show that the company or facility prevents workers' rights to freedom of association and collective bargaining and a corrective action plan with a clear timeline for completion has not been developed.

Table B2. Reference scale for Child labour.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The company has made eliminating the use of child labour in its own organisation, its entire value chain including clients a top priority and can demonstrate the success of its approach.
1	The company or facility has a management system in place to raise awareness of issues associated with child labour within its organisation, its subcontractors and its tier 1 suppliers, with the aim to address the root causes of child labour in the region it operates, and takes action as appropriate, like improving the accessibility to schools.
0	No incidents of child labour are discovered and the company or facility has a management system in place that enforces the policy prohibiting child labour.

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-1	Incidents of child labour but no incidents referring to the worst forms of child labour or children in hazardous work have been discovered within the company or facility and a corrective action plan with a clear timeline for completion has been developed.
-2	Incidents of child labour, including the worst forms of child labour and children in hazardous work have been discovered.

Table B3. Reference scale for Fair salary.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	All workers receive the (major share of) additional social benefits as defined for retirement, health insurance, disability coverage on top of the living wage levels for a standard family defined in the Wage-indicator project.
1	All workers are paid at least a living wage for a standard family as defined by the methodology of the Wage indicator.
0	All workers are paid the living wage for a single household.
-1	Not all workers are paid the living wage for a single household or are not paid the legal or industry minimum wage and/or social benefits are not according to applicable law, but the company has committed to resolve this issue clearly defined timeline.
-2	Workers are paid below the poverty line in the country or region, or if this is not defined in the country or region, the payment is clearly insufficient, or workers are not paid the legal or industry minimum wage and/or social benefits are not according to applicable law. There is no commitment to address this issue.

Table B4. Reference scale for Working hours.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The company has a management system in place to pro-actively and continuously improve problems related to working hours, beyond an acceptable level and can show tangible results of these efforts
1	All workers work their contracted working hours, where the working hours respect the industries standard/law. Flexible working hours are acceptable
0	All workers work their contracted working hours, where the working hours respect the industries standard/law.
-1	Incidents have been discovered that show that the company or facility exceeds contracted working hours, but a corrective action plan with a clear timeline for completion has been developed.
-2	Incidents have been discovered, that show that the company or facility exceeds contracted working hours and a corrective action plan with a clear timeline for completion has not been developed.

Table B5. Reference scale for Forced labour.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The company has made eliminating the use of forced labour in its own organisation and its entire value chain, including its customers a top priority and can demonstrate the success of its approach.

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1	The company or facility has a management system in place that successfully eliminates the use of forced labour in its own organisation, its subcontractors and its tier 1 suppliers.
0	There are no reports or signals that the company uses forced labour and all workers are employed under reasonable and documented terms which prohibits retention of all or part of a worker's salary, benefits, property or original documents.
-1	Incidents of forced labour have been discovered within the company or facility and a corrective action plan with a clear timeline for completion has been developed.
-2	Incidents of forced labour have been discovered within the company or facility, and a corrective action plan with a clear timeline for completion has not been developed.

Table B6. Reference scale for Equal opportunities.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The company or facility has a management system in place that pro-actively promotes non-discrimination in its organisation and the entire supply chain. The commitments, performance, progress and effectiveness of programmes are reported publicly. The top management of the company or facility have publicly recognised non-discrimination as a key priority.
1	The company or facility has a management system place that pro-actively promotes non-discrimination in its organization, its subcontractors and its tier 1 suppliers, for instance by at least two of the following: 1. Trainings/education programs and events to raise awareness 2. Employee committees to address certain issues 3. Speak-Up Line 4. Commitments from tier 1 suppliers
0	The company or facility has a management system in place to enforce the non-discrimination policy in its company.
-1	Incidents of discrimination have been discovered, the company or facility has established a corrective action plan with a clear timeline for completion.
-2	Incidents are reported revealing discrimination is frequently occurring or is part of the companies' culture and procedures.

Table B7. Reference scale for Health and safety.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The company is best in class compared to its peers on OHS performance.
1	The company has a management system in place to pro-actively and continuously improve the working culture, beyond an acceptable level and can show tangible results of these efforts.
0	Working conditions and working culture are adequately protecting occupational health and safety, which includes that equipment, the use of personal protection equipment, the prevention of harassment are conforming to the state of the art regarding safety and exposure.

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-1	There has been a neglect in the working conditions (culture) regarding the maintenance and promotion of occupational health and safety, which results in high accident rates and deteriorating health conditions of workers, but the company or facility has developed a corrective action plan with clear timeline for completion.
-2	There is a neglect in the working conditions (culture) regarding the maintenance and promotion of occupational health and safety, which results in high accident rates and deteriorating health conditions of workers.

Table B8. Reference scale for Employment relationship.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The level of protection afforded by the contract is beyond requirements and provide a longterm employment. There is room for negotiation between employer and employee.
1	There is a presence of a written contract which defines the relationship between the employers and workers (rights and responsibilities of each), presence of contracts' essential elements and all workers have a copy of the signed contract
0	There is a presence of a written contract which defines the relationship between the employers and workers (rights and responsibilities of each)
-1	No written agreements in presence only verbal agreements
-2	No agreements in presence

Table B9. Reference scale for Sexual harassment.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The level of protection afforded by the contract is beyond requirements and provide a longterm employment. There is room for negotiation between employer and employee.
1	There is a presence of a written contract which defines the relationship between the employers and workers (rights and responsibilities of each), presence of contracts' essential elements and all workers have a copy of the signed contract
0	There is a presence of a written contract which defines the relationship between the employers and workers (rights and responsibilities of each)
-1	No written agreements in presence only verbal agreements
-2	No agreements in presence

Table B10. Reference scale for Access to material resources.

<b>Scale level</b>	<b>Definition of the scale level</b>
2	The company has made the access to material and immaterial resources a top priority and is actively investing in this priority that have resulted in substantial improvements.
1	The company or facility has an effective management system in place to continuously and significantly improve the local community's access to material and immaterial resources.

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0	No incidents of actual damage, adverse impacts or risks to the community's access to material and immaterial resources that can be related to actions by the company.
-1	The actions of the company have resulted in incidents of actual damage, adverse impacts or risks to the community's access to material and immaterial resources, but a corrective action plan with a timeline for completion has been developed.
-2	The actions of the company have resulted in incidents of actual damage, adverse impacts or risks to the community's access to material and immaterial resources and a corrective action plan with a timeline for completion has not been developed.

Table B11. Reference scale for Safe and healthy living conditions.

Scale level	Definition of the scale level
2	The company or facility has publicly stated that health and safety for local communities is a high priority and publicly reports and discloses its commitments, performance, progress and effectiveness of the management system/initiatives/activities, confirming an exceptionally high performance on EHS.
1	The company or facility has a management system in place to address the health and safety of local communities beyond the requirements set in the local laws and this results in better than average performance on EHS.
0	The company has procedures in place that has prevented incidents causing significant health and safety impacts.
-1	Incidents of preventable significant damage, adverse impacts or risks to community health and safety have been discovered, but a corrective action plan with a timeline for completion has been developed, and this policy has led to a decrease of such incidents.
-2	Incidents of preventable significant damage, adverse impacts or risks to community health and safety have been discovered, and the company does not have the intention to address this.

Table B12. Reference scale for Local employment.

Scale level	Definition of the scale level
<b>Skill development and Contribution to economic development</b>	
2	The company actively invests in public private partnerships or invests in the local community, in a way it creates new business opportunities and jobs and reduces the skill gap in the region and is recognised as a constructive force in the region that contributes to economic development.
1	The company has a policy to stimulate job and- creation in the local community by hiring new staff, working with local suppliers or sub-contractors. The policy includes a commitment to help to increase the economic growth in the region and reducing the skill mismatch.
0	The company employs local workers and sources from local communities purely based on business criteria like quality, price and timing, and does not engage in actions that can weaken the local governance mechanism.

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	The company is also managing the skill gap in a way that members of the local community are sufficiently qualified when new staff is hired.
-1	There is a significant skill-gap between the future needs of the company and the skill levels of local community members, but the company has started to address this with an action plan with a clear timeline.
-2	There is a significant skill-gap between the future needs of the company and the skill levels of local community members. The company is not doing anything to improve this situation.

Table B13. Reference scale for Supplier relationship.

Scale level	Definition of the scale level
2	The value chain actors has a publicly stated a successful collaboration with each other. The sources of a successful collaboration is a high priority and publicly reports and discloses its commitments, performance, progress and effectiveness of the management system/initiatives/activities.
1	The value chain actor has a commitment to a long-term trading partnership that enables both sides to co-operate and grow through information sharing and joint planning.
0	The company sourcing from the value chain actors does this under the condition that contracted trading terms are respected. For example lead time, volume fluctuations and absence of coercive communication with suppliers.
-1	The company that sources from the community of small-scale entrepreneurs, is aware of unfair trading relationships and corruption, and has developed but a corrective action plan with a clear timeline for completion.
-2	Evidence indicates that there is a substantial risk of unfair trading relationships. The company sourcing from this area does not take action or is even complicit in this process and a corrective action plan with a clear timeline for completion has not been developed.



DEPARTMENT OF TECHNOLOGY MANAGEMENT AND ECONOMICS

DIVISION OF ENVIRONMENTAL SYSTEM ANALYSIS

CHALMERS UNIVERSITY OF TECHNOLOGY

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