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Sustainability Performance of an Italian Textile Product

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Abstract: Companies are more and more interested in the improvement of sustainability performance of products, services and processes. For this reason, appropriate and suitable assessment tools supporting the transition to a green economy are highly necessary. Currently, there are a number of methods and approaches for assessing products' environmental impact and improving their performances; among these, the Life Cycle Thinking (LCT) approach has emerged as the most comprehensive and effective to achieve sustainability goals. Indeed, the LCT approach aims to reduce the use of resources and emissions to the environment associated with a product's life cycle. It can be used as well to improve socio-economic performance through the entire life cycle of a product. Life Cycle Assessment (LCA), Life Cycle Costing (LCC) and Social Life Cycle Assessment (S-LCA) are undoubtedly the most relevant methodologies to support product-related decision-making activities for the extraction and processing of raw materials, manufacturing, distribution, use, reuse, maintenance, recycling and final disposal. While LCA is an internationally standardized tool (ISO 14040 2006), LCC (except for the ISO related to the building sector) and S-LCA have yet to attain international standardization (even if guidelines and general frameworks are available). The S-LCA is still in its experimental phase for many aspects of the methodological structure and practical implementation. This study presents the application of LCA and S-LCA to a textile product. The LCA and S-LCA are implemented following the ISO 14040-44:2006 and the guidelines from UNEP/SETAC (2009), respectively. The functional unit of the study is a cape knitted in a soft blend of wool and cashmere produced by a textile company located in Sicily (Italy). The system boundary of the study includes all phases from cradle-to-gate, from raw material production through fabric/accessory production to the manufacturing process of the product itself at the Sicilian Company. Background and foreground processes are taken into account using primary and secondary data. The analysis evaluates the environmental and social performances related to the specific textile product, but also outlines the general behaviour of the company. The case study also highlights pro and cons of a combined LCA and S-LCA to a textile product in a regional context.

Keywords: social life cycle assessment; life cycle assessment; sustainability; textile sector

JEL Classification: Q56

1. Introduction

One of the main production sectors in Italy is represented by the textile industry. According to the latest data published by the Italian Fashion System (in italian Sistema Moda Italiana—SMI), this sector seems to have not suffered from the economic crisis. In fact, the sector registered, in 2016, more than 400,000 employees in nearly 50,000 companies and reports a turnover of about €52 billion, up 1.8% from 2015 figures (Il Sole 24 Ore 2017). Innovation and research as well as the tradition of specific production processes, know-how and synergistic collaboration among the various stages of the supply chain are the main reasons for this success. Another important success factor is connected to the quality added value associated with the "Made in Italy" brand thanks to the well-known brands such as Armani, Gucci, Valentino and so on, which have contributed to the recognition and appreciation of Italian products in the world (Patrick et al. 2016; Snaiderbaur 2009).

On the other side, globalization has strongly influenced this sector and the competition between companies of different countries has grown more and more in the last decades. One of the first effects was to move production phases to countries where labour force costs are lower and less restrictive norms on environmental emissions are set. Many examples can be cited in order to highlight the significance of this phenomenon, such as: the terrible working conditions in a Chinese jeans factory as evidenced in the documentary movie "China Blue[1]"; the disaster in Dhaka (Bangladesh) in November 2012 where a clothes factory collapsed, killing 112 people, because the building was not adequately restored; the H&M company that was involved in a scandal in its supply chain with factories in Myanmar employing 14-year-old workers (The Guardian 2016). Fortunately, customers' interest, as in any other sector, is changing and more attention is being paid to the sustainability performance of products, including those of fashion. This is also demonstrated by the proliferation of labels to guarantee ethical and sustainable production of fashion products, yet the many labels often confuse customers.

Textile products often present a complex supply chain, with raw material produced in Asia or Africa where often non-compliances to International Labour Organization (ILO) conventions in labour conditions have been identified, even in the case of products labelled made in Europe, because the finishing phase is made in a European country. This complexity of the textile and clothing industry has made it difficult to assess the social and environmental issues along a product's life cycle.

This study focuses on the environmental and social life cycle assessment of a knitted garment produced in a textile factory (San Lorenzo Group), located in San Marco d'Alunzio, Messina (Italy), a village situated in the Nebrodi (Sicilian mountains), presently (or predominantly?) an agricultural reality, characterized by farmhouses. The study aims to identify positive and negative impacts of the product in this specific context and to use the results as an input for the decision-making process in the company.

The choice was not random, indeed social and environmental assessment and reporting is still an uncommon business practice in Sicilian companies (Italy). By the way, this company plays a meaningful role for the local community in terms of offering jobs and added value to the region. The life cycle sustainability assessment is implemented according to Finkbeiner et al. (2010) and UNEP (UNEP/SETAC 2012). The social life cycle assessment implementation (S-LCA) has already been detailed in Lenzo et al. (2017), and the combination of the two sustainability dimensions in the product life cycle is presented here. It is one of the few studies carried out on this topic.

An example of studies related to LCA on textile products is Wiedemann et al. (2015), where an LCA Methodology of co-product handling for different sheep production systems is reported. This paper focuses on alternative methods of handling co-production of wool and live weight from dual purpose sheep systems to the farm-gate.

Another example is Zamani et al. (2016) on the identification of Hotspots in the clothing industry using S-LCA by input-output modelling, though in this case no primary data on the clothing product was collected. Furthermore, with this study we have a contemporary implementation of LCA and S-LCA, two of the three sustainability dimensions.

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1 China Blue is a 2005 documentary film directed by Micha Peled http://teddybearfilms.fatcow.com/2011/09/01/china-blue/.

2. Goal, Scope, System Boundary and Assumptions of the Study

The main goal of this study is to carry out the environmental and social assessment of the life cycle of a knitted garment from cradle to gate, in order to provide CEOs of the companies with environmental and social information useful to product decision making. Furthermore, because the S-LCA is a relatively new methodology, it was important to implement this methodology together with LCA to better understand benefits and limits, when implemented in a region, like Sicily, where a company as the San Lorenzo Group represents the only source of employment.

The functional unit of the study is one knitted garment in a soft blend of wool and cashmere (60% wool and 40% cashmere). The flow unit for the LCA consists of 495 capes. The whole manufacturing process of the order of the garment (495 pieces) was carried out from August 2016 to October 2016. This garment was randomly chosen by the authors in order to represent a typical production of the company. It has the function of protecting the body against cold in winter and at the same time, with its elegance it has an aesthetic value (Figure 1). The product analysed, contains characteristics common to almost all products manufactured within the San Lorenzo Group and it includes all process units of the company such as cutting, ironing, etc. These processes are common to almost all products manufactured within the San Lorenzo Group. Raw materials (fabrics and accessories) are the only elements that differentiate one garment from another.

Figure 1. The object of the study, a garment 60% wool and 40% cashmere.

All data on the environmental inputs and outputs of the manufacturing phases realized in San Lorenzo Group, have been collected according to the flow unit.

The production processes can be split into the following sub-processes:

- cutting—orders are first processed through the cut bubble (that indicates the number of accessories, the fabric, the measurements and the number of products necessary to meet the customer's order) and the CAD, then the fabric is cut through both automatic cutting and manual cutting;
- stitching—"Double-Face" stitching carried out entirely by hand, with needle and thread, by seamstresses living in the towns of the Nebrodi area who preserve and renew this ancient and specific hand-made art of tailoring;
- ironing;
- quality check;
- tagging—the finished garment is identified by the tag, and packaged according to size and customer delivery note.

The system boundaries of both the LCA and S-LCA studies are illustrated in Figure 2.

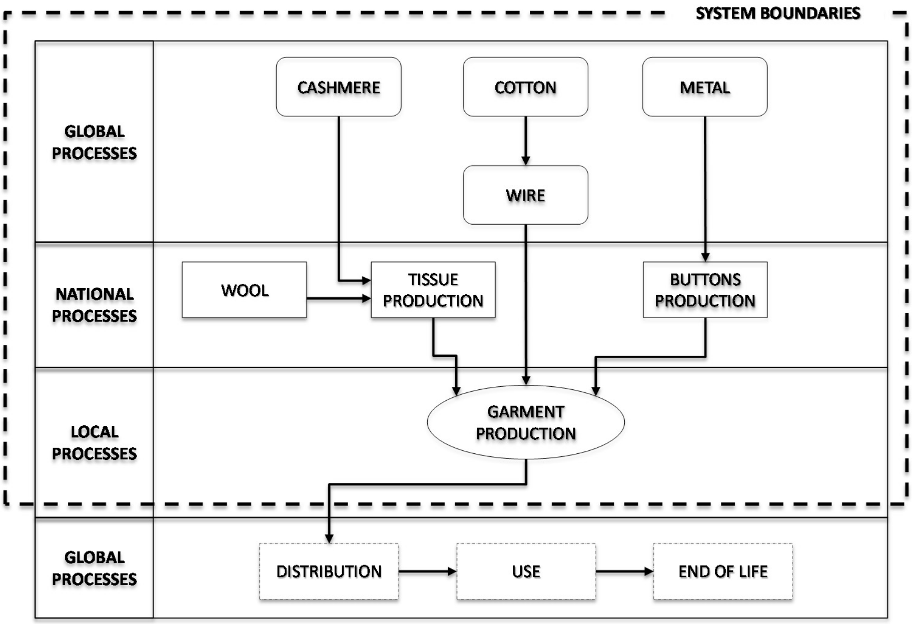

Figure 2. System boundary of both LCA and S-LCA.

The system boundaries selected to carry out both assessments (LCA and S-LCA) follow a "cradle to gate" approach. Thus, the analyses are performed, on the one hand, by excluding the distribution phase, on the other, by including, at least for the LCA, the transport of the raw materials (wool and cashmere) and other important elements (such as the buttons). Regarding the social LCA the authors have not considered the transport system because the data on transport in Social Hotspot Database are too generic (Lenzo et al. 2017). Primary and secondary data were collected for both assessments. The primary data were obtained by using questionnaire and by collecting data from company invoices. The LCA, and in particular the Life Cycle Impact Assessment (LCIA) phase, was carried out by means of Simapro software and Ecoinvent database; while, the S-LCA was performed by using the Social Hotspots Database (Norris and Benoit-Norris 2015), in order to perform a Risk assessment of the production phases upstream of the San Lorenzo Group (Lenzo et al. 2017).

For the LCA study, due to a lack of specific secondary data, the following assumptions were made:

- according to the S-LCA performed in Lenzo et al. (2017), cashmere is produced in Mongolia (the main producer of cashmere worldwide) and wool in Italy. Due to a lack of Mongolian specific inventory data, in the LCA here presented, the production processes related to cashmere and wool are considered as the same, and data related to wool production in New Zealand is assumed to be the same for the production in Mongolia and in Italy. This choice was in accordance with the Mongolian Wool and Cashmere Association which declared (in 2013) a cooperation between Mongolia and New Zealand in wool and cashmere production (Mongolian Wool and Cashmere Association 2013). Furthermore, the transport activities of cashmere from Mongolia to Italy were considered assuming transport by freight ship through the so-called "Silk Route";
- processes related to material recycling are not considered in the system boundaries and only their transport to the recycling plant is considered; and
- the location of some plants for the manufacturing process is assumed to be in Italy. In particular, the wool yarn and the tissue (made with cashmere and wool) are assumed to be produced in Prato (Tuscany), that represents one of the biggest Italian textile districts and one of the most important textile industries worldwide (Regione Toscana 2017).

LCA Data sources are detailed in Table 1.

Table 1. Inventory data and data sources related to the flow unit of 495 items of clothing produced by the San Lorenzo Group.

LCA Phase	Sub-Processes	Unit	Amount	Data Sources
Raw material	Greasy wool	kg	321	Primary data, Cardoso (2013)
	Greasy cashmere	kg	214	Primary data, Cardoso (2013)
	Steel	kg	9.5	Primary data, Ecoinvent, Steel, low-alloyed, at plant/RER U
	Cotton	kg	0.3	Primary data, Ecoinvent, Cotton fibres, at farm/US U
	Polyethylene (PE)	kg	0.7	Primary data, Ecoinvent, Fleece, polyethylene, at plant/RER U
	Polypropylene (PP)	kg	49.5	Primary data, Ecoinvent, Polypropylene, granulate, at plant/RER U
	Cardboard	kg	10	Primary data, Corrugated board, mixed fibre, single wall, at plant/RER U
Manufacturing material	Tissue (wool and cashmere)	kg	535	Primary data, Ecoinvent, Textile refinement, cotton/GLO U
	Buttons	kg	9.5	Primary data, Ecoinvent, Steel product manufacturing, average metal working/RER U
	Cotton wire	kg	0.3	Primary data, Ecoinvent, Textile refinement, cotton/GLO U
	Paper (CAD)	kg	1.2	Primary data, Ecoinvent, Paper, woodfree, uncoated, at integrated mill/RER U
	PE label	kg	0.7	Primary data, Ecoinvent, Fleece production, polyethylene terephthalate/RER U
	PP bags	kg	49.5	Primary data, Ecoinvent, Extrusion, plastic film/RER U
	Tissue paper	kg	0.7	Primary data, Ecoinvent, Kraft paper, bleached, at plant/RER U
	Cardboard boxes	kg	10	Primary data, Ecoinvent, Packaging, corrugated board, mixed fibre, single wall, at plant/RER U
Cloth production	Cutting (CAD + Cutting)	kWh	129.7	Primary data, Ecoinvent, Electricity, low voltage, at grid/IT U
	Stitching	kWh	398,233	Primary data, Ecoinvent, Electricity, low voltage, at grid/IT U
	Ironing	kWh	674.4	Electricity, low voltage, at grid/IT U
		m^3	7.2	Primary data, Ecoinvent, + Water, decarbonised, at plant/RER U
	Packaging	kWh	168	Primary data, Ecoinvent, Electricity, low voltage, at grid/IT U
	Waste	kg	38.9	Primary data

Table 1. *Cont.*

LCA Phase	Sub-Processes	Unit	Amount	Data Sources
Transport raw materials (T1)	Greasy wool	kgkm	6840	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER U
	Greasy cashmere	kgkm	684	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER U
		kgkm	5,930,280	Primary data, Ecoinvent, Transport, transoceanic freight ship/OCE U
		kgkm	57,000	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER U
	Steel for buttons	kgkm	190	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER U
	Cotton for wire	kgkm	6.9	Primary data, Ecoinvent, Transport, van < 3.5 t/RER U
	PE for labels	kgkm	14	Primary data, Ecoinvent, Transport, van < 3.5 t/RER U
	PP for packaging bags	kgkm	990	Primary data, Ecoinvent, Transport, van < 3.5 t/RER U
	Cardboard for packaging boxes	kgkm	200	Primary data, Ecoinvent, Transport, van < 3.5 t/RER U
Transport manufactured materials (T2)	Woven transport	kgkm	1,470,600	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER U
		kgkm	3705	Primary data, Ecoinvent, Transport, barge/RER U
	Buttons	kgkm	20,330	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER U
		kgkm	61.7	Primary data, Ecoinvent, Transport, barge/RER U
	Wire	kgkm	1207.4	Primary data, Ecoinvent, Transport, van < 3.5 t/RER U
		kgkm	2.2	Primary data, Ecoinvent, Transport, barge/RER U
	PE labels	kgkm	1498	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER U
		kgkm	4.5	Primary data, Ecoinvent, Transport, barge/RER U
	PP bags	kgkm	105,930	Primary data, Ecoinvent, Transport, van < 3.5 t/RER U
		kgkm	321.7	Primary data, Ecoinvent, Transport, barge/RER U
	Paper	kgkm	3154.3	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER U
		kgkm	7.7	Primary data, Ecoinvent, Transport, barge/RER U
	Tissue paper	kgkm	1498	Primary data, Ecoinvent, Transport, van < 3.5 t/RER U
		kgkm	4.5	Primary data, Ecoinvent, Transport, barge/RER U
	Cardboard boxes	kgkm	21,400	Primary data, Ecoinvent, Transport, van < 3.5 t/RER U
		kgkm	65	Primary data, Ecoinvent, Transport, barge/RER U
Transport waste (T3)	Waste to recycling	kgkm	38,426.8	Primary data, Ecoinvent, Transport, lorry 3.5–7.5 t, EURO5/RER
		kgkm	412	Primary data, Ecoinvent, Transport, barge/RER U

3. Life Cycle Impact Assessment of an Italian-Made Garment

Life cycle assessment results are calculated through the impact assessment method ReCiPe Midpoint (H) V1.09 which allows a high level of detail by including eighteen different impact categories. The characterization results are reported in Figure 3. It is evident that the main impacts are caused by the transport phase and the cloth production. The transport should be deeply investigated to have more detailed information in line with further investigations on the social impact of the San Lorenzo Group supply chain. No primary data were available for the transport system for social nor for environmental LCA. Indeed, for the LCA secondary data modelled throughout SimaPro were used. For the social LCA a research on where raw materials are mainly produced was carried out to estimate at least, the social risk of the raw materials. One result was that cashmere is mainly produced in Mongolia. This assumption, the choice of secondary data, was also made when calculating the environmental impact of raw materials' transport. An in-depth analysis of LCA results underscores that the contribution of the transport phase to environmental impacts ranges from 90.2% for water depletion to 27.6% for urban land occupation. In particular, the transport of the manufactured material (T2) contributes the most to all impact categories. Regarding the cloth production phase, the highest environmental impacts are connected to electricity consumption during the stitching sub-process.

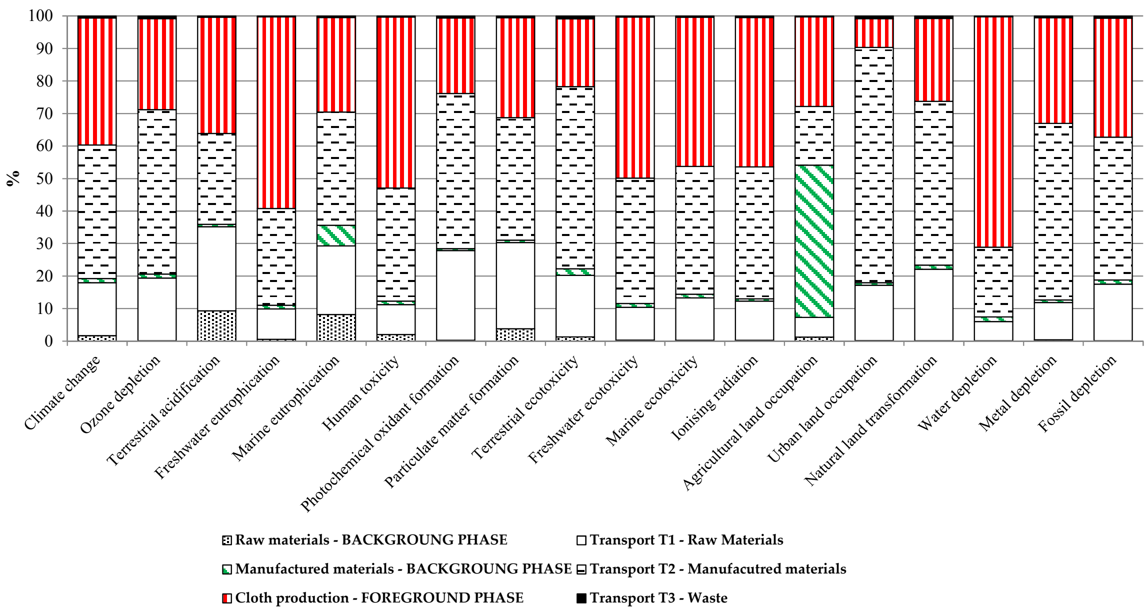

Figure 3. Contribution analysis related to the functional unit of one garment knitted in a soft blend of wool and cashmere (characterization results).

Combining the S-LCA to the LCA of a Garment

The study has been carried out according to the Guidelines for Social Life Cycle Assessment of Products (UNEP/SETAC 2009), which defines S-LCA as a complementary approach of the standardized LCA technique by using the same phases.

The S-LCA presented here assesses the social impacts of a selected textile product by adopting, for the characterization phase, the Subcategory Assessment Method (SAM). The SAM method allows for the comparison of obtained results against the reference point of the International Labour Organization Standard, in order to score the results between A (good performance) and D (bad performance) (Ramirez et al. 2014). The results of the assessment according to the SAM method are reported in Table 2.

According to the results reported in Lenzo et al. (2017), the S-LCA results showed a good social performance of the manufacturing phase at San Lorenzo Group, with the necessity to investigate further on the freedom of bargaining and freedom of association of the workers, as the indicator used could not give a clear result (Table 2). For the Social Risk assessment of upstream processes, the main risks identified were related to the cashmere production in Mongolia (Table 3). A further assessment on the social impact of transport should be made or at least a risk assessment to understand if this process unit is relevant for the S-LCA.

In more specific terms, the study showed that the textile company is a socially responsible company, and it takes into account the expectations of its workers, meeting their needs related to health and safety, salary and career development. For the manufacture of the garment, the company has implemented a path of social responsibility, establishing a strong relationship with its employees and the territory. For example, the company by hiring home-office workers meets the necessity of older workers or people who are not able to move alone from home, allowing them to maintain their economic independence. This ensures the continuation of the tradition of "double-face" needlework. No working injuries in the past five years is a clear signal of good performance in health and safety procedures. The organization not only respects the national laws on health and safety, it provides additional health benefits to older employees and their families. The company is also engaged in activities and events for the local community.

A social risk assessment was carried out for the upstream supply using Social Hotspot database (Norris and Benoit-Norris 2015). The results showed that the main social risks occur for the cashmere produced in Mongolia. The main risks are related to child labour and corruption.

As mentioned by Lenzo et al. (2017), it is difficult to summarize the social results without having primary data for the upstream process. Further research is ongoing in order to have a more transparent supply chain.

Combining both assessments, it is clear that further attention has to be paid to improve data quality related to upstream processes in order to better assess the social and environmental dimensions of the investigated system. Indeed, transport is the main hotspot highlighted in the LCA analysis, but the social impact of the transport phase has not yet been considered in the upstream risk assessment. On the other side the main social risks are associated with the production of cashmere in Mongolia, but the assumption made in the LCA (due to the lack of inventory data specific to Mongolian production) may limit the environmental results.

However, by combining the two implementations, the company has a relevant source of inputs useful to improve its environmental and social performances, but collecting primary data from the whole supply chain remains the main obstacle to carrying out a complete life cycle sustainability assessment.

Table 2. Results of the S-LCA of a garment produced at San Lorenzo Group.

Stakeholders	*Worker*								*Local Community*			
Subcategory	Freedom of Association and Collective Bargaining	Child Labour	Working Hours	Forced Labour	Equal Opportunities/Discrimination	Fair Wages	Health and Safety	Social and Social Security Benefits	Commitment to Local Communities	Cultural Heritage	Local Employment	Access to Intangible Resources
Level	C	B	B	B	A	B	A	A	B	A	B	A
Assessment	2	3	3	3	4	3	4	4	3	4	3	4

Table 3. Social Risk assessment of upstream processes.

Theme	**Characterized Issue**	**Country-Specific Sector**							
		Mongolia (Cashmere)		**Italy (Wool)**		**Italy (Metal Production)**		**Germany (Wire)**	
		Risk Value	**Characterized Results**	**Risk Value**	**Characterized Results**	**Risk Value**	**Characterized Results**	**Risk Value**	**Characterized Results**
Labour rigths abd decent work	*Working Time*								
	Risk of excessive working time by sector	No data	No Data	1000	Medium	1000	Medium	1000	Medium
	Freedom of association and collective bargaining								
	Risk that a country lacks or does not enforce Freedom of Association rights	5333	High	1000	Medium	1000	Medium	1000	Medium
	Labour Laws								
	Risk that country does not provide adequate labour laws	5202	High	0.753	Low	0.505	Low	0.505	Low
	Child labour								
	Risk of Child Labour in sector, Total	7500	Very High	No data	No Data	No data	No Data	No data	No Data
	Forced Labour								
	Risk of Forced Labour by Sector	1000	Medium	0.258	Low	0.258	Low	0.258	Low
Health andSafety	*Occupational Injuries and Deaths*								
	Risk of no access to an Improved Source of Drinking Water-total	2000	Medium	7750	High	5500	High	0.010	Low
	Occupational Toxics and Hazards								
	Risk of loss of life years by airborne particulates in occupation	5278	High	2448	Medium	2448	Medium	2448	Medium
Human Rights	*Gender Equity*								
	Risk of Gender inequality by Sector based on representation in the workforce	1571	Low	1006	Low	1006	Low	0.151	Low
	Human Health Communicable Diseases								
	Risk of Mortality from Communicable Diseases	1140	Medium	1805	Medium	1805	Medium	0.741	Low
	Human Health Non communicable Diseases and other health risks								
	Risk of Mortality from Non-communicable Diseases	3753	Medium	0.334	Low	0.334	Low	0.741	Low
	Indigenous Rights								
	Risk that indigenous people are negatively impacted at sector	2600	Medium	No Evidence	Low	No Evidence	Low	No Evidence	Low

Table 3. *Cont.*

Theme	**Characterized Issue**	**Country-Specific Sector**							
		Mongolia (Cashmere)		**Italy (Wool)**		**Italy (Metal Production)**		**Germany (Wire)**	
		Risk Value	**Characterized Results**	**Risk Value**	**Characterized Results**	**Risk Value**	**Characterized Results**	**Risk Value**	**Characterized Results**
Governance	*Corruption*								
	Risk that corruption is a hindrance to doing business in a country	5002	High	3402	Medium	3402	Medium	0.010	Low
	Legal System								
	Overall Risk of fragility in the legal system	7000	High	1800	Medium	1800	Medium	0.406	Low
Local Community	*Access to Improved Sanitation*								
	Risk of no access to an Improved Source of Sanitation	5000	High	No Data	No Data	No Data	No Data	No Data	No Data
	Access to Improved Drinking Water								
	Risk of no access to an Improved Source of Drinking Water-total	3337	Medium	No Data	No Data	No Data	No Data	No Data	No Data
	Access to Hospital Beds								
	Risk that there are too few hospital beds to support population	No Data	No Data	1000	Low	1000	Low	0.010	Low

4. Discussions and Conclusions

The first LCA and S-LCA on an Italian-made garment is the focus of this study. Primary and secondary data were collected to obtain a first estimation of social and environmental impacts associated with a wool/cashmere garment made in Italy, from raw materials' extraction to the gate manufacturing processes at the San Lorenzo Group company. The garment has an important social and economic value because it is handmade and it is produced in an Italian region with a high unemployment rate where this company represents the main source of employment in the textile sector. This analysis is part of a bigger study which aims to develop a methodology to assess the sustainability performance of textile products by broadening the environmental aspects to include social and economic benefits of a production made in Italy. The first results on the social and environmental performance reported in this study show that the transport phase and the upstream phases need further evaluation. Indeed, the results may present some limitations that are mainly related to the integration of the same processes in both LCA and S-LCA assessments, as well as to the assumptions made to address the lack of primary data of some processes, since collecting primary data from the whole supply chain remains the main challenge for a complete life-cycle assessment. In particular, transport for which the LCA highlighted the main environmental hot-spot, has not yet been considered in the upstream risk assessment for evaluating the social impact. Furthermore, by applying the S-LCA it emerges that the main social risks are related to the production of cashmere in Mongolia, but, because of the lack of specific Mongolian production inventory data needed to perform the LCA, some assumptions were made by considering the production of wool and cashmere in New Zealand and thus limiting the possibility to obtain a good comparison/integration between the results of both tools. This underscores the fact that access to primary data related to the whole supply chain is essential for carrying out a detailed analysis. Nevertheless, in the context of the manufacturing firms (generally SMEs), and in particular, the textile sector, their limited influence on decision making along the supply chain makes difficult the collection of related primary inventory data. Future in-depth evaluations will be mainly focused on overcoming these limitations in order to obtain good primary environmental and social data that would allow a higher level of detail in the analysis.

Author Contributions: Dr. Lenzo and Prof. Traverso have made the collection of the data and the general structure of the paper and the implementation of the S-LCA. Ing Mondello and Prof. Salomone have worked more in details on the environmental dimension; Prof. Ioppolo contributed in finalizing the paper.

Conflicts of Interest: The authors declare no conflict of interest.

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