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Circular activities alignment with Sustainable Development in the Textile Industry

A Case study of Nudie Jeans

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Abstract

The increased environmental degradation generates pressure on the transition from a linear- to a circular economy to lessen the environmental impact through increased resource efficiency that shall contribute to sustainable development. Circular activities within firms play an essential role in the transformation to create a closed-loop system. Since the textile industry has one of the largest environmental impacts, this thesis aims to address how circular activities within the clothing firm Nudie Jeans, as a leader in sustainability work, align with sustainable development. This is done through a qualitative research design whereas a case study on Nudie Jeans will be conducted based on both primary and secondary sources. The interviews are of semi-structured characteristics with both internal and external relevant actors to gather insight on the subject. The interviews will further be complemented by literary sources, both primary and secondary as the sustainability report of 2020.

Keywords: Circular activities, Sustainable development, Product innovation, Nudie Jeans, Sustainability, Waste-management, Resources, Natural-Resource Based View

Table of content

1. Introduction	1
1.1 Problem discussion	2
1.2 Purpose & Research question	3
1.3 Expected results	3
2. Conceptual framework	4
2.1 Sustainable development and the need for circular activities and product innovation	4
2.1.1 Sustainable development and corporate sustainability	4
2.1.2 Circular economy	4
2.1.3 Waste Hierarchy	5
2.1.4 Life-Cycle approach and thinking	6
2.2 Firms alignment with Sustainable development in the textile industry	6
2.2.1 Product Innovation	6
2.2.2 The Natural-Resource Based View	7
2.3 Theories as a framework	11
3. Methodology	11
3.1 Research strategy and design	11
3.2 The choice of Case Study	12
3.3 Data Collection	13
3.3.1 Primary data & interviews	13
3.3.2 Selection of respondents	14
3.3.2.1 Structure of the respondents in the empirical result	15
3.3.3 Secondary data	15
3.4 Quality of the study	15
3.5 Ethical aspects	16
4. Empirical Results	16
4.1 Sustainability report	16
4.1.1 Material	16
4.1.2 Cotton & the SDG's	17
4.1.3 Certifications	18
4.1.4 Production	18
4.1.5 Chemical Usage	19
4.1.6 Water Usage	19
4.1.7 Climate Impact	20
4.2 Interviews Nudie Jeans	20
4.2.1 Sustainability manager	20
4.2.2 Supply chain coordinator	23
4.3 Interviews External organizations	24
4.3.1 Reserach Institute of Sweden (RISE)	24
4.3.2 Swedish Fashion Academy (SFA)	27
4.3.3 Göteborgs Stad - Hållbar Konsumtion & Privatekonomi (GS)	29
4.3.4 Naturskyddsföreningen (NF)	30

5. Analysis	30
5.1 Circular activities within Nudie Jeans	30
5.2 Product innovation within Nudie Jeans	33
5.3 Nudie Jeans alignment with Sustainable development	35

6. Discussion & Conclusion	39
6.1 Concluding Discussion	39
6.2 Recommendations	41

References

Appendix

Appendix A

Appendix B

Table of Figures

Figure 1 - <i>System diagram of circular economy</i>	5
Figure 2 - <i>People, planet, profit and product</i>	7
Figure 3 - <i>List of respondents in primary data collection</i>	15

1. Introduction

Natural resource depletion, environmental degradation and social inequality all pose threats to our future in terms of the environment, human lives, and economic growth. As a consequence of these complex and critical challenges sustainability has emerged (UN, n.d.a). Sustainability can be described as a paradigm for envisioning the future in which environmental, economic, and societal factors are balanced in the pursuit of an improved global quality of life (UNESCO, n.d). To approach these pressing problems sustainable development, seen as the many processes - e.g., sustainable production and consumption is needed to meet the long-term goal of sustainability (UNESCO, n.d). The 2030 Agenda for Sustainable Development - including the 17 Sustainable Development Goals (SDGs) adopted by the United Nations recognizes the importance of letting strategies of sustainable development go hand in hand. Moreover, the SDGs provide a blueprint for how action can be taken (UN, n.d.b).

The textile industry is one of the biggest economic sectors and the industry's chemical use, water use, and greenhouse gasses (GHG) pose serious threats to people and the environment (SFA, n.d). The pressure on the textile industry is increasing and accountability for environmental and social impact is expected. A transformation has begun, and sustainable considerations are done from the designing stage, resourcing, production and to end of use (SFA, n.d) In this transition circular economy and activities could function as a tool to transform for sustainable development and decouple economic activity from the consumption of finite and scarce resources (Ellen MacArthur Foundation, n.d.a). Activities that are favored by the circular economy are activities that preserve value through lessening the usage of energy, labor, and materiality. This could be achieved through initiatives that prolong e.g., a product's life cycle such as repair, reuse, remanufacture, and recycling, further through keeping materials and the components of materials within a closed-loop circle (Ellen MacArthur Foundation, n.d.b).

A firm that has been recognized for their sustainability work and circular activities is Nudie Jeans. The firm expresses its aspiration to become a leader within the textile industry along with continuous improvement of sustainability performance. Founded in 2001 in Gothenburg and today active in 50 markets worldwide, the purpose of Nudie Jeans was based on an idea, throughout the passion for dry denim, of doing the opposite of the industry (Nudie Jeans, 2022). At the birth of Nudie Jeans, firms were rarely based on tangible values, which made the founders decide to permeate environmental awareness and human rights into everything they do (Nudie Jeans, 2019).

Before circularity became the buzzword of today, Nudie Jeans' history of sustainable product innovation began with the belief that garments you love - you keep (Nudie Jeans, 2022). Nudie Jeans focus on where they have the largest impact, such as substituting the use of harmful chemicals, reducing GHG emissions and increasing both transparency and traceability for the entire supply chain. Still today the main intention remains to create beloved garments, initiatives to increase the lifespan of the dry denim, take advantage of the resources, and further cherish the assets of the earth (Nudie Jeans, 2020).

1.1 Problem discussion

Our world's challenges – ranging from climate, water, and food crises and inequality – require solutions (UN, 2015). As environmental issues have grown more critical, complex and in scope, there is recognition that addressing the most pressing environmental issues will require the proactive engagement of the firms in the business sector (ARCS, n.d). Alignment with sustainable development is needed, hence an integrated approach where environmental and social concerns are considered within economic development (UN. n.d).

The textile industry is one of the biggest economic sectors and one of the most environmentally damaging as each year millions of tonnes of clothes are produced, worn, and thrown away (Ellen MacArthur foundation, n.d b). Today the industry is accountable for approximately 10 % of humanity's carbon emissions, one of the biggest contributors to pollution and the second-largest for water supply, which indicates the harmfulness in the production. Regardless of this environmental impact, data compared to the year 2000 people bought 60 % more clothes in 2014, meanwhile, the life length of each garment was half as long. Moreover, 85 % of all textiles get thrown away each year (World economic forum, 2020). These practices can be compared to the linear economic system often referred to as the take-make-waste-system, where new resources are extracted, and waste created. (Ellen Macarthur Foundation, n.d). Therefore, action within the textile industry is essential in changing the course of events. Moreover, the extent of the sustainability challenges is a threat to the industry's current practices and preparing for the future is essential (SFA, n.d). The business models and short-term thinking that dominate the textile industry are not compatible with sustainability and to make a transition disruptive innovation on a large scale including new processes, materials and circular activities are needed (World Economic Forum, 2020).

The focus has shifted from *why* firms should be concerned with sustainable development and instead refocused on *how* they can achieve sustainable development (World Economic Forum, 2020). Today we see a textile industry that has recognized the *why* in - e.g., growing regulatory and stakeholder pressure, which has resulted in sustainability being on top of the industry's agenda (World Economic Forum, 2020). In the question of how, circular activities within a circular economy could function as a tool for sustainable development. Keeping products in circulation becomes of significance through activities as repair, reuse, and recycling to prevent waste (Ellen Macarthur Foundation, n.d). Though these are still complex and new ways of thinking for many firms within the industry, the problem that remains is *how* sustainability moves from the agenda to being operationalized in the business. Further what considerations must be done throughout the whole product life - from the designing stage to the end of use (SFA, n.d). With the importance of approaching the environmental issues within the industry and answering *how* to align with sustainable development, Nudie Jeans becomes the focus in this case study with their engagement in circular activities.

1.2 Purpose & research question

The purpose of this thesis is to investigate how circular activities within Nudie Jeans align with sustainable development. As a part of creating circular activities product innovation will be touched upon. Hence the purpose is to shine light on - the *how*, formulated in the problem discussion. Based on the above problem discussion the researchers have finalized the following research question:

RQ: How does circular activities within Nudie Jeans align with sustainable development?

1.3 Expected results

The results of this thesis aim to provide an understanding of which circular activities within Nudie Jeans align with sustainable development and which are not as effective. As much earlier research touched upon *why* sustainable development is needed, this thesis hopes to provide more results for *how* it can be included through the case of Nudie Jeans circular activities.

2. Conceptual framework

2.1 Sustainable development and the need for circular activities

2.1.1 Sustainable development and corporate sustainability

Sustainability is defined in the Brundtland report from 1987 as *“Meeting the needs of the present without compromising the ability of future generations to meet their own needs”* (UN, n.d.d). To reach the goal of sustainability the activities within sustainable development as expressed through the SDGs are needed to act for the protection of the planet. The 17 SDGs are all integrated and are further developed and expressed to coordinate the core elements of sustainable development; economic growth, social inclusion, and environmental protection (UN, n.d a). Implementation, as well as the success of the SGDs, relies on countries' sustainable development policies. Therefore, the country's firms together with all stakeholders e.g., governments, civil sector, etc. are expected to contribute to the realization of the agenda (UN, n.d.a). Corporate sustainability has emerged as the connection between the economic aspects and a firm's environmental, social and governance practices have become clear. The well-being of humanity and the planet is closely tied to business and firm actions. Hence Corporate sustainability is important both from a societal perspective, to ensure that markets deliver value across society. Moreover, from the firm view it creates long-term corporate successes. To be sustainable, much focus is on operating in line with universal principles and acting - as in line with sustainable development. (UN, 2015). Hence corporate sustainability can be seen as a firm's efforts to align businesses with sustainable development to reach the long-term goal of sustainability.

2.1.2 Circular economy

The transition from a linear to a circular economy is an integral part of sustainability and is being watched and evidenced as a necessary step to achieve sustainable development (European Commission). The current linear economy could be described as; the take-make-waste system (Ellen Macarthur Foundation, n.d). The circular economy on the other hand has a mission to create markets that give incentives to reusing products, rather than creating waste and extracting new resources. The circular economy and its activities can function to protect the environment, use natural resources more effectively, develop jobs and new sectors as well as develop new capabilities (UN, n.d). Three principles of achieving a circular economy by design are: Eliminate waste and pollution, regenerate nature, and circulate products and materials at their highest value. The circular economy gives tools to approach climate change and the issue of biodiversity while

addressing social needs. There are two main cycles in the circular economy – the technical cycle and the biological cycle. In the technical cycle, products are kept in circulation through repair, reuse, and recycling to prevent waste. In the biological cycle, materials are returned to the Earth, through processes that allow the land to regenerate so the cycle can continue. (Ellen Macarthur Foundation, n.d). This is further where the link to sustainable development and product innovation can be found, by addressing environmental issues.

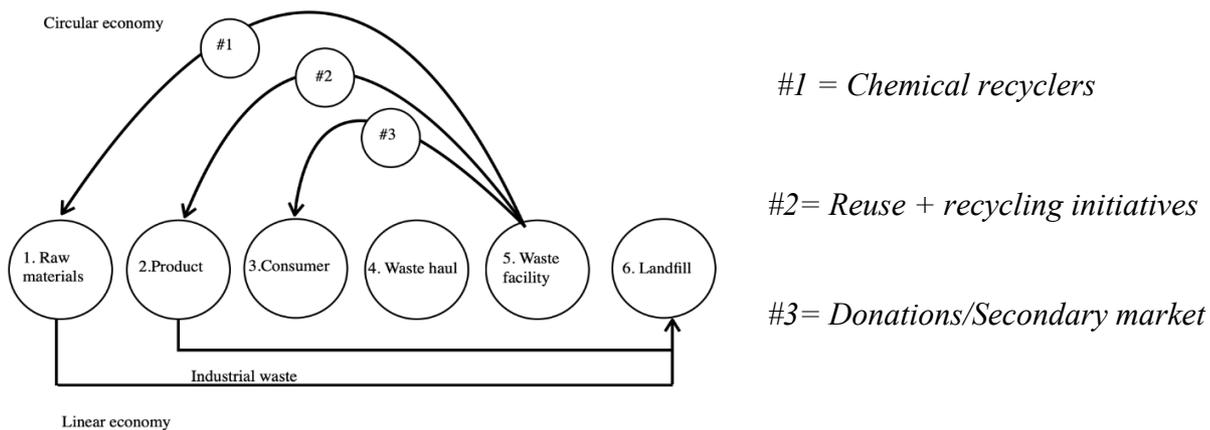


Figure 1, Inspired by: rts (n.d) System diagram of circular economy

2.1.3 Waste hierarchy

The definition of waste according to the Waste Framework Directive is “An object the holder discards, intends to discard or is required to discard” (EU, 2012). As a part of the EU waste framework directive, the waste hierarchy aims to guide on how to design waste treatment methods. The framework aims to protect human health and the environment by reducing or in the best-case preventing waste, changing views on the management of waste and efficiency of resources. The hierarchy is divided into five levels where *waste prevention* is the most desired approach and the other ones being: *preparing for reuse, recycling, other recovery and disposal* (EUR-LEX, 2018). Here is a more detailed description of the two top levels where this thesis further will focus.

Waste prevention: This stage represents the most efficient use of resources and acting in sustainable matters for circularity. Here re-use and design play an important role since it provides a longer life span for the product and less creation of waste, thus the concept implies that the purpose of the product gets repeated (EU, 2012). By reaching the goal of waste prevention the firm can contribute to; improved resource efficiency through example reduced material use, energy use, and water use. Moreover, waste management can contribute to a reduction of

environmental impacts such as greenhouse emissions or chemicals (EU, 2012). Forms of strict avoidance of waste such as; limiting unnecessary consumption and design of products can be performed to achieve waste prevention. Moreover, actions in the forms of prevention can be performed through the diversion of waste flow, this includes actions at end-of-life for the product as; re-use, refurbishment, or repair (EU, 2012). *Preparing for re-use*: In this stage, the production has already formally created waste according to the definition. The stage should imply awareness that there is a possibility to divert products to become waste by preparing them in terms of repair, cleaning, and sorting and allowing them to come to use in other contexts (EU, 2012).

2.1.4 Life cycle approach and thinking

To undertake the Waste Hierarchy and move towards a state of waste prevention and minimize the environmental impact, the life-cycle approach (LCA) is often used to overview the effects on the whole product's existence sphere. Taking into consideration all from the extraction of raw materials to the end-of-life of product/service (EU, 2012). Life cycle thinking in this way can function to stimulate drastic changes in product design where the effect of environmental impact over the whole life cycle is considered from the starting point. Extended producer responsibility (EPR) has become more popular with the realization of stakeholders and increasing stakeholder pressure. EPR, therefore, encourages LCA and re-thinking the design of products and services to expand their responsibility (EU, 2012).

2.2 Firms alignment with Sustainable development in the textile industry

Given the great influence of the textile industry, the industry has become one of the most polluting and resource-draining with large usage of especially raw materials, energy, and water (Ellen MacArthur Foundation, 2022; Pal & Gander, 2018). However, the industry also has suitable circumstances to deplete the large negative environmental influences, primarily through various circular activities (Ellen MacArthur Foundation, 2022). Though the concept of sustainable development and circular economy is complex, firms need strategies and frameworks to operationalize (RISE, 2021). The NRBV and concept of product innovation aim to explain approaches for firms to move towards sustainable development.

2.2.1 Product Innovation

Product innovation is defined as *“A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses ./.”*

(OECD, 2005). Where improvements in components and materials, technical specifications, incorporated software, and functional characteristics are included (OECD, 2005). Moreover, this could be linked to the Waste Hierarchy (*see 2.1.1*), within waste prevention design of products plays an important part in creating efficient use of resources and enabling circularity (EU, 2012). In literature the emergence of product innovation from the internal side of firms is investigated, dependent on resources, capabilities, technology and knowledge, or customer needs, and the expectations from the firm owner (Reguia, 2014). Innovation is a critical key to business success and in line with the realized importance of sustainability, there has been a change in measuring success within this to the non-economic scale (Hansen, Grosse-Dunker, and Richwald, 2009). Sustainability-oriented innovation (SOI) can be defined as the introduction of a new or improved product/service that leads to environmental (or) and social benefits compared to the prior version, which will improve the physical life-cycle for the product/service. SOI covers both sustainability issues and the inclusion of market segments; this will result in a positive value contribution to the firm (Hansen & Grosse-Dunker, 2012). Within sustainable textile product innovation success factors, important criteria for environmentally friendly textiles are; the renewability of resources, minimal or no use of chemicals to cultivate and process materials, in all a smaller ecological footprint (Rese et al, 2021).

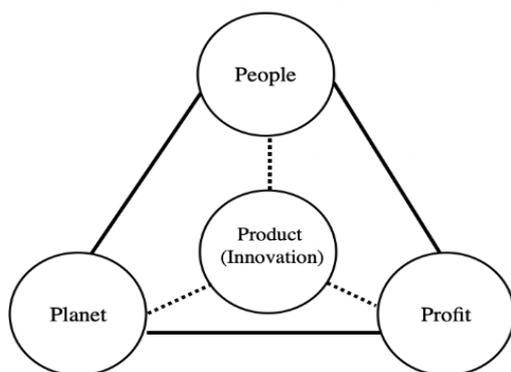


Figure 2, People, planet, profit and product, inspired by: UNEP; Design for Sustainability

2.2.2 The Natural Resource-Based View

The Resource-Based View explains the concept of how a firm's performance can be determined by the resources and capabilities it has at its disposal. Depending on the setup of resources, and further, how this setup is used and configured, it may enable the firm to increase its performance and through that achieve sustainable development and potentially a sustained competitive

advantage. *The Natural Resource-Based View* (NRBV) is based on the idea of *The Resource-based view* (RBV) but works on the principle that a company's competitive advantage fundamentally depends upon its relationship with the natural environment (Hart, 1995).

Properly designed environmental standards can result in innovations that lower the total cost of a product alternatively, advance its value. Through enhanced resource productivity, companies can use the inputs more effectively which aims to increase the product's lifecycle and further decrease the product's environmental impact. Offsetting the cost of environmental impact and ending the stalemate, will certainly make companies more competitive (Porter & Linde, 1995).

The resources and capabilities of a firm play an essential role within the NRBV. A *resource* is something a firm dominates, which may be of tangible, intangible, or human character. Tangible resources are signified by a physical or financial asset, e.g., machinery, stores, or monetary assets. Intangible resources lack physical substances but have a great value for the company. This could be patent and software as well as knowledge, skills, reputation, and brand names. Lastly, human resources refer to mainly competent and knowledgeable employees (Barney, 2013). Commonly, a resource needs to be valuable, rare, inimitable and non-substitutable to gain competitiveness (Hart, 1995). Value is often defined as the customer's increased willingness to pay, whereas the rareness allows the company to diversify. Furthermore, inimitability means that the product must be difficult to imitate and lastly, non-substitutable simply describes how a substitute for a product should not be able to be recreated (Hart & Dowell, 2011). A capability, shortly, is what the firm can perform based on its resources (Barney, 2013). *"It is likely that strategy and competitive advantage in the coming years will be rooted in capabilities that facilitate environmentally sustainable economic activity - a natural resource-based view of the firm"* (Hart, 1995). Based on the above statement, three key strategic capabilities were recognized as interconnected strategies that may contribute to competitive advantages that support sustainable development. Those key capabilities were identified as pollution prevention, product stewardship, and sustainable development. Each of these three frameworks has a favorable incentive for the environment and further represents specific circular activities that aim to contribute to sustainable development (Hart & Dowell, 2011)

The primary step, pollution prevention, serves the role of lessening disposal and waste for the company through different pollution control equipment and strategies such as *material substitution and material innovation, recycling, incremental process innovations, developing and deploying climate-friendly production technology* and, *redesigning value-chain activities* (Hart & Dowell, 2011). Less waste corresponds with better utilization of inputs, generating lower costs for raw

materials and waste disposal. Low-cost advantages that arise from pollution prevention initiatives are several. However, the learning curve advantages that are due to climate-based value chain reconfigurations, may be of most value since it gives rise to interdependence within the company based on their unique conditions – further making it challenging and expensive for competitors to rapidly imitate. However, these are only a couple of examples of what pollution prevention contributes to (Porter & Reinhardt, 2007).

The second strategic level of NRBV, product stewardship, helps to reduce the life cycle costs of products through the integration of new capabilities within products and operations. This is of relevance since every step of the supply chain, from raw material acquisition and production processes to disposition of used products – all have an environmental impact. For a product to achieve a low life cycle environmental burden, product design needs to e.g., diminish the use of non-renewable materials, avoid the use of toxic chemicals and continue to develop products with lower life cycle costs (Hart, 1995). By a more recent review of product stewardship, meeting new technology and knowledge for the circular supply chain are essential, as well as it requires external coordination of resources as take-back facilities, remanufacturing- and recycling processes (Hart & Dowell, 2011). The return of resources to the supply chain requires creation of new capabilities and collaboratively with external partners, which as well includes reliance on cooperation with customers and potentially also investment in suppliers for treatment of returned products (Govindan et al., 2015).

Lastly, sustainable development aims to decrease the total environmental burden that comes along with a company's growth. Moreover, if the fundamental aim of pollution prevention is to reduce emissions and product stewardship serves the regulation and authority of product design, sustainable development aims to connect the two strategies and further correlate traditional business with innovative sustainability (Hart, 1995). The notable difference between pollution prevention and product stewardship is that sustainable development does not actively seek to lessen environmental damage, it rather exists to produce in a way that can be maintained endlessly into the future. Something essential, as well as interesting is that sustainable development is neither restricted by environmental concerns. The social, and especially the economic aspects of sustainability are also of relevance since a firm needs to be economically sustainable to be able to manage both pollution prevention and product stewardship. However, the three interconnected frameworks of NRBV do move in the same direction and should be working along with each other

thus, sustainable development is not the result of a strategy but an approach (Hart & Dowell, 2011).

2.3 Theories as framework

To operationalize sustainability the NRBV and product innovation explain how a firm, through the implementation of circular activities, can move towards a more sustainable business, through longer product life and more efficient use of resources (see *Figure 1* and *Figure 2*). Within the textile industry, NRBV provides elucidations of how materials and production affect pollution prevention, product stewardship through product life, and moreover, sustainable development. The framework assists to identify how and on what level Nudie Jeans is working with circular activities. Supply chain management research uses the NRBV frequently to explain closed loop-systems, which proves its relevance (Sakarlis et al., 2011). Moreover, the theory has been reevaluated in light of new developments and remains relevant for further empirical research (Hart & Dowell, 2011). The waste hierarchy and LCA become relevant to understanding the impacts of the design phase, providing an explanation for forms of waste management as avoidance and diversion to identify Nudie Jeans circular activities. In line with the NBRV, it focuses on the different stages and measures towards achieving a product with lower environmental impact and alignment with sustainable development and circular economy (See *Figure 2*). Earlier research is raising the definition of product innovation and the connection to sustainability (See *Figure 1*) moreover addressing success factors for environmental product innovation within the textile industry that can be derived from the NRBV and the Waste Hierarchy. There is to some extent a research gap on how specific circular activities and product innovation of textile firms create opportunities to contribute to a reduction of negative environmental impact. This identified gap alongside the earlier literature contributions of sustainable development, circular activities, and product innovation will create the foundation for this thesis.

3. Methodology

3.1 Research strategy & design

Researchers have chosen to conduct a qualitative research study to answer the research question, moreover, to conduct a case study oriented on Nudie Jeans in particular. The qualitative approach is significant for emphasizing words and differs from the quantitative method in that it has an abductive approach to the theory and further since it is often constructive (Bryman & Bell, 2011).

Constructivism explains how individuals seek explanations and understanding of how things work. All individuals have a subjective perception of experiences, which leads to the researchers' task being to find the complexity of ideas and strategies (Creswell, 2018). This further explains how the qualitative approach is profound rather than broad which creates dynamism and offers specific insights and in-depth understanding provided of the verbal as well as non-verbal communication. The methodology gives rise to spontaneity as well as it is permissive against oscillations and enables potential adjustments (Bryman & Bell, 2011).

The way the research oscillates between empiricism and theories signifies an abductive approach between theory and research. The method is largely illustrated by an inductive approach as it seeks patterns in the empirical observations and further develops the theoretical framework based on those. However, it also has deductive elements with the theories as a starting point for analysis. The combination of inductive and deductive approaches clarifies abductive reasoning whereas the researchers commute between empirical material and theory (Alvesson & Sköldbberg, 2008). For clarification, the researchers cannot possibly avoid subjective interpretations within the abductive reasoning. However, awareness of one's opinions is used together with the theoretical framework to explain expected as well as unexpected concepts, frameworks, functions, etc. A qualitative method includes understanding and interpreting the social activities behind different operations whereas the respondents reproduce their reality (Dubois & Gadde, 2002). Abductive reasoning allows us to distinguish the social characteristics as a result of the interaction between individuals (Alvesson & Sköldbberg, 2008).

3.2 The choice of Case study

This thesis is performed as a Case study. A case study aims to generate in-depth scrutiny of a single case, proportionate to which they engage the theoretical analysis. Awareness of a smaller sample is used, and that the analysis of the empirical findings is completed by the researchers, there may be a risk of bias and some decreased possibility to generalize conclusions (Bryman & Bell, 2011). However, this argument to an extent is a misunderstanding regarding the single case study and the scientific inputs it contributes to. The nearness to reality made through observations is certainly context-specific, however, the close knowledge of different specific cases is a common attribute for all experts which also becomes synonymous with how context-specific knowledge becomes central in the area of learning. The kind of contextual knowledge the single case study provides could rarely be accomplished through extensive samples (Flyvbjerg, 2006). Moreover,

the case studies can give rise to closeness to the chosen area of the subject which creates a nuanced view of the real-life enforcements. Furthermore, it contains a substantial element of good narratives, which approach complexities and contradictions within the chosen field of research as well as serve to evaluate research-specific knowledge (Bryman & Bell, 2011). The company appointed, Nudie Jeans, aims to be one of the leaders within the industry in terms of its strategic sustainability work (Nudie Jeans, 2019). The advantage of a singular sample appointed case is the depth of understanding that a single case phenomenon generates. Further, the approach of a single phenomenon of a company explores the practices of the research question rather than “the general rules” of the practices. More specifically, the case study methodology is problem-driven which serves as the best way to answer the given research question. The structure of the case study usually begins with an exploratory approach, quickly followed by a descriptive approach and termination of an explanatory approach (Bryman & Bell, 2011). Descriptive research is often conducted and applied when the goal of the research is to define or describe a particular phenomenon or pattern and often relies on reality. Often, the researchers collect information to describe a pattern that further will benefit the general public. However, the study is as well accompanied by an explanatory approach since it aims to explain the causes and consequences of a quite well-defined problem where earlier studies on the subject have been performed, thus since a new approach to the problem has been conducted, an exploratory approach is included as well (Sheppard, 2020)

3.3 Data collection

3.3.1 Primary data and interviews

The primary data was collected through interviews to enable the qualitative method of understanding and interpreting (*see 3.1*). The primary data was collected following a guide to qualitative data collection. Following the interview category of; semi-structured interviews, audiotaping and thereafter transcribed (Creswell, 2018). The semi-structural nature of the interview is based on an interview guide adapted after the specific respondent (*see Appendix A and B*). The questions were delivered to the respondents before the interview to ensure a more elaborate answer and complemented by follow-up questions. The interviews were conducted digitally through Zoom/Teams under the timespan of 30-60 minutes. After the data collection, the process of data interpretation and analysis took place. The first step is to organize and prepare data, through transcription and translation further scanning the collected material. The second step is creating a general sense of the data, followed up by the third step and fourth step of coding

through organizing the data into segments (Creswell, 2018). This was done mainly into categories; the background of the organization, circular activities, product innovation, and sustainable development. Finishing the data analysis with interpreting the extracted interview material.

3.3.2 Selection of respondents

The selection of respondents can be separated into two groups, the internal team from Nudie Jeans and external actors from regional and national organizations within the sustainability and textile field. The contact within Nudie Jeans began by establishing contact with Maria Erixon Levin, co-founder of Nudie Jeans. Maria being the co-founder and overview of the whole firm thereafter directed the researchers to the staff of relevance. Based on the researchers' description contact was established with the sustainability department and the Sustainability Manager. The sustainability department is central to the organization's structure and everyday decision-making. This provides the researchers with great insight into Nudie Jeans as a whole (Nudie Jeans, 2020). The second interview with the Nudie Jeans Supply Chain Coordinator was intentionally sampled through email, this respondent was reached out to answer to enlighten the understanding of circular activities in the supply chain. The external organizations were intentionally sampled and thereafter the specific respondents were snowball sampled (Bryman & Bell, 2011). This was the case at Naturskyddsföreningen, Research institutes of Sweden (RISE), Swedish Fashion Academy (SFA), Göteborgs Stad – Institution for citizen service and democracy – Sustainable consumption and personal finances. The thesis topic and questionnaire were explained, which set the direction for respondents within the relevant field. The choice of these organizations was based on their capability to create a broader picture and understand the concepts of circularity, product innovation, and aligning business with sustainable development within the textile industry. SFA is a leading educational organization within sustainable transition and circularity, moreover, they are aimed at the fashion/textile industry and interact with Nudie Jeans through etc. administration of STICA (SFA, n.d). RISE is a research institute and innovation partner aiming to contribute to a competitive business community and a sustainable society. Moreover, RISE has a partnership with Nudie Jeans both regarding both chemical use and creating more durable products (RISE, n.d). Naturskyddsföreningen and the institution within Göteborgs stad provides a regional understanding of Nudie Jeans and further have a great expertise within sustainable production and consumption and circular economy (Naturskyddsföreningen, n.d and Göteborgs Stad, n.d).

List of respondents

Code name	Actor	Title
SM	Nudie Jeans	Sustainability Manager
SC	Nudie Jeans	Supply chain coordinator
RISE	Research institutes of Sweden (RISE)	Researcher
SFA	Swedish Fashion Academy (SFA)	Director of Sustainability Education
NF	Naturskyddsföreningen	Volunteer
GS	Göteborgs Stad - Institution for citizen service and democracy - Sustainable consumption and personal finances	Planning Manager within Sustainable Consumption

Figure 3, List of respondents in primary data collection

3.3.2.1 Structure of the respondents in the empirical result

The order structure of interviews will follow; Nudie Jeans and then the external organizations. This is to gather specific information regarding the case company to build on the earlier detailed level of the theoretical framework. Thereafter link Nudie Jeans actions with the broader context of sustainable development, circular activities, and product innovation in the textile industry.

There is a variation in the subcategories of the interviews, this is due to the complexity and the intertwined nature of sustainable development, circular activities, and product innovation.

Moreover, variation is due to the different respondents' knowledge areas and the semi-structured nature of the interviews which further provides the spontaneity of respondents' answers.

3.3.3 Secondary data

As a first step, the theoretical framework and background were collected through a literature review to gain an understanding of the topic and what is already known and studied within the field. A literature review helps relate researchers to ongoing literature dialogue and identify research gaps, moreover, it provides understanding for the reader and establishes the importance of the research question, allowing the comparison in the analysis to earlier studies (Cresswell, 2018). The conceptual framework was collected through electronic databases; Google Scholar, the search

engine GUPEA, and Supersök accessible through the University of Gothenburg. Criteria for earlier research within GUPEA were based on work written within the Business Administration department furthermore through chosen keywords to ensure theme and relevance. Keywords as; sustainable development, product innovation, sustainability within the textile industry, Nudie Jeans, circular economy, circular activities, waste management, Natural-Resource Based View. The Nudie Jeans Sustainability Report further constitutes an important role as a secondary data representative of the whole firm's sustainability profile and gives insight into detail. This report was audited and published at the beginning of 2021 and contains Nudie Jeans sustainability work within the year 2020.

3.4 Quality of the study

To ensure the quality of the research, trustworthiness, and authenticity need to contend. To achieve trustworthiness, all features of the concept need to be fulfilled. The included features are *credibility* - to ensure that the findings are of belief, *transferability* - whether the findings appeal to other contexts, *dependability* - whether the findings are likely to apply at other times and *confirmability* - whether the researchers have allowed their values to intrude the study (Lincoln & Guba, 1985). Investigator bias is a risk to confirmability in the context of qualitative interviews since the questionnaires are human-designed. Therefore, the concept of triangulation in promoting confirmability is emphasized in interview settings to reduce the effect, moreover, the data collected. Different methods could function in triangulation to complement each other, e.t.c supporting data to provide background, further via data sources a wider range of informants and documents could be used to verify the case (Shenton, 2004). To fulfill these criteria in the case study information was gathered through multiple sources such as; sustainability reports, websites, earlier research, and internal and external interviews. This made the case follow both internally and externally produced documents and opinions to confirm answers. The same goes for ensuring credibility, the findings become more credible for the readers if similar results/answers emerge from different sources and respondents according to the concept of circling reality (Shenton,2004). The case study fulfills the criteria through diverse interviews and data material. Regarding transferability, it's the investigators' responsibility to ensure that sufficient contextual information about the case is presented to enable a transfer from the reader's perspective (Shenton, 2004). These criteria are fulfilled through the conceptual framework for a greater understanding of sustainable development, circular activities, and product innovation; this enables the case study to be applied to other situations. Lastly, dependability is achieved throughout this methodology

ensuring that the following procedure in the same context would lead to similar results (Shenton, 2004).

3.5 Ethical aspects

Ethical considerations and guidelines are a highly essential aspect of the quality of the research. The ethical considerations that the researchers primarily face around this case study are, of course, about finding a reasonable balance between different interests where everyone is legitimate (Bryman & Bell, 2011). The researchers aim to reflect upon the ethical aspects of the qualitative interviews conducted, the independence as well as the integrity of the company, and the individuals who show up for the interviews. Before conducting interviews and assessing data, recording, and transcription of the interview needs to be approved by the interviewee. Any desired anonymity will be taken into account as well as respected.

4. Empirical result

Nudie Jeans puts efforts into systematic sustainability work where the sustainability report has a vital role in communicating their actions. Therefore, the empirical result will start in the Sustainability Report of 2020. Moreover, the focus will be on material and production since the largest environmental impacts from their products emerge within these stages. Nudie Jeans prioritized SDGs are 8: Decent work and economy, 15: Life on land, 13: Climate action, 12: Responsible consumption and production, and 17: Partnership for the goals. They aim to capture the areas in which Nudie Jeans have the largest impact - which tangent with the material and production area to a large extent. Specific components within these areas will be lifted; material, cotton, certifications, chemical usage, water usage, and climate impact (Nudie Jeans, 2020). Thereafter interviews with respondents from Nudie Jeans will be presented and lastly the empirical result from the external organizations (*See 3.2*).

4.1 Sustainability Report

4.1.1 Material

Nudie Jeans strives to take responsibility for the whole life cycle of the product - from the raw materials to the end of life. This impacts the design of products to promote usefulness for its consumers moreover longevity through garments that can be repaired and restored. Nudie Jeans has close cooperation with fabric suppliers, keeping track of new developments and technologies, and adapting thereafter to enable the exploration of more sustainable materials. *The Material Tool*

was created in 2018 and aims to set guidelines in line with the company's sustainability goals for the product developer and designers. The tool is based on *the Higg Material sustainability index* (MSI) and *Made By's environmental benchmark for fibers*, the combination of these frameworks provides classification and captures the complexity of fiber impact (Nudie Jeans 2020). Together they enable Nudie Jeans to participate in industry benchmarks as the *Textile exchange preferred material benchmark*. Fiber types can be compared with other actors and guide the way forward for material use. The material tool is divided into three categories, *Sustainable fibers*, *Non-sustainable fibers* and *Do not use*. Sustainable fibers are divided into three categories were class one contains for example, Recycled cotton, Reused Nudie Jeans, Traceable organic and/or Fairtrade cotton, and recycled down. The classification is based on standards of sustainability, circularity, and fibers being traceable. Nudie expresses that this clear classification that further gets readjusted with time scrutinizes the definition of sustainable fibers and therefore gives great insight into the firm's product development and overall sustainability work (Nudie Jeans 2020).

4.1.2 Cotton & the SDGs

The largest environmental impact is located within the raw material stage, being active in this specific industry and focusing on jeans, cotton becomes the central and the focus of this thesis. To mitigate environmental impacts Nudie Jeans has chosen to direct more sustainable options in their business to take more responsibility for ecosystems and biodiversity, here organic cotton is one of the most important initiatives. Organic cotton is produced by other farming methods compared with traditional cotton and excluding pesticides, genetic modification and artificial fertilizers reduces risk for both the farmers and the environment. Furthermore, promoting small-scale organic farmers can change the distribution of other resources such as water, more efficiently (Nudie Jeans, 2020). The investment in organic cotton is further strengthened by the SDGs, Nudie Jeans describes the choice of organic cotton as intended to align with *SDG 13, Climate Action; 13.3, Improving education, awareness-raising, and human and institutional capacity on climate change mitigation, adaptation, and impact reduction. SDG 12, Responsible production and consumption*, moreover, *12.2 sustainable management and efficient use of natural resources*, and *12.5 Substantially reduce waste generation through prevention, reduction, recycling, and reuse*. Parts of the organic cotton are Fairtrade certified and sourced from the organization Chetna Organic based in India, which aligns with *SDG 9, which is Industry, innovation, and infrastructure*. More specifically target *9.3, Increase the access of small-scale industrial, and other enterprises to market, value-chains, and financial services*. Moreover, *SDG 17, Partnership for the goals*, and specifically *17.16. Enhancing the global partnership for sustainable*

development, complemented by multi-stakeholder partnerships that mobilize and share knowledge (Nudie Jeans, 2020).

Recycled cotton at a fiber level is further an initiative to make use of cotton already produced. Recycling is being done both internally and externally, both pre-consumer and post-consumer. Internally recycled means Nudie Jeans know the input is since it's their policy, when externally collected material, the source is harder to identify. Another way to extend the life of the material is by reusing actual fabric. Nudie Jeans aims to repair either whole products or part of products, both through the repair service included for all Nudie Jeans' jeans and sold second hand in the Reuse range. New initiatives are also taken through arrangements that connect suppliers of leftover fabric and material with buyers. This is, according to Nudie Jeans, a way to efficiently make use of resources that are already existing, though it requires innovative resource thinking. A product is defined as a sustainable product when at least 70% of the fibers in the product conform to the sustainable fibers defined in the Material Tool and further strengthened by using certification from suppliers. Considering Nudie Jeans in 2020, 94% of Nudie Jeans total fiber use is consistent with organic and/or Fair Trade, reused, recycled cotton. The "sub-goals" for organic cotton were reached in 2012 when all denim was produced with organic cotton and later in 2017, the rest of the product offerings (Nudie Jeans, 2020).

4.1.3 Cotton certifications

Nudie Jeans make efforts to use certified raw materials. Organic cotton is certified differently depending on its geographical origin. Either following Global Organic Textile Standards (GOTS), the US Department of Agriculture (USDA), or the Organic Content Standard (OSC). Nudie Jeans is moreover a GOTS certified brand since 2020 and the communication of the certification on a product level, ensures the entire production performance aligns with the criteria. Nudie Jeans can as a result, sell certified GOTS products (Nudie Jeans, 2020).

4.1.4 Production

Nudie Jeans focus remains on constructing a high-quality product for a reasonable price; however, the company considers itself responsible for all actions taken throughout the supply chain, adequate social- and environmental working conditions as well as a clean production process. *SDG 8; decent work and economic growth, represent the comprehensive aim for the company,* however, the company's work affects several SDGs since they aim to take responsibility for all actions throughout the supply chain (Nudie Jeans, 2020).

4.1.5 Chemical use

Chemicals are recognized in the manufacture and treatment of textiles through fiber manufacturing, bleaching, dyeing, and printing of fabrics as well as added to the finished product. Nudie Jeans works toward lessening the amount of harmful chemicals as well as developing more sustainable substitutes. For example, through developing a policy following The European Chemical Legalization REACH to create quality products and safe working conditions. Moreover, using distinct certifications in the textile market to reinsure and communicate that a product is chemically safe. Nudie Jeans also complies with GOTS which Nudie Jeans regards to be the most comprehensive organic textile standards since it involves the complete supply chain and its scope. The cotton is either organic and Fairtrade, reused, or recycled (Nudie Jeans, 2020). Looking at the aspect of chemicals, reused or recycled is naturally preferable since these do not “add” chemicals to the existing denim. Furthermore, organic cotton is advantageous since it is not provided with chemicals in the cultivation, hence reducing the total use of chemicals in the complete product. About 94% of all cotton used by Nudie is organic, regardless, however, chemicals need to be added to create and finish the denim. To take responsibility for this, Nudie Jeans chooses to only operate with suppliers with functioning chemical handling and superior wastewater systems (Nudie Jeans, 2020).

4.1.6 Water usage

The industry of denim is water-intensive, already at the stage of raw material acquisition, water becomes central. How the cotton fields are watered depends on the geographical location therefore the ecological feature is important in the reduction of water usage (Nudie Jeans, 2020). Organic cotton fields are, unlike the traditional cotton fields, more systematically located in an area that can be irrigated by rainwater, the smaller size further creates possibilities for effective irrigation systems. Moreover, enabling capacities to control and embrace the specific characteristics of soil (Textile Exchange, 2014). To address water issues within the manufacturing process in the entire denim industry, various technologies and methods have been developed (Nudie Jeans, 2020). One of Nudie Jeans suppliers, Bossa has developed a new technique of dyeing, *Save Blue Concept*, with a mission to strive for zero water usage and has achieved 85% water in comparison with conventional dyeing (Bossa, 2020). Nudie Jeans has chosen to solely cooperate with suppliers with established qualitative water treatment systems. Further consideration of how the water is purified, local ecosystem, location, and water resource is assessed. In the user phase, a step towards decreased water usage, it becomes important to inform customers how to take care of Nudie Jeans garments (Nudie Jeans, 2020).

4.1.7 Climate Impact

The Greenhouse gas protocol standard classifies a company's GHG emissions into three scopes. Scope 1 covers direct emissions from owned or controlled sources, Scope 2 covers indirect emissions from the generation of purchased electricity consumed by the reporting company, and lastly, Scope 3 covers all other indirect emissions that occur in the company's value chain (Greenhouse Gas Protocol, 2022). Scope 3 - based on the knowledge that 58% of the company's total emission is generated in the production process. The emissions included in the calculation of Scope 3 are all emissions generated by energy or fuel consumption throughout Nudie Jeans supply chain, carrying raw material suppliers, fabric suppliers, trim suppliers, production suppliers, and further all transportation needed between, as well as packaging materials. Climate work is a challenge and a project under progress as knowledge and opportunities increase, this is handled by Nudie Jeans by various offsetting programs. The company has invested in offsetting wind power and biomass power plants projects, located either where suppliers are or cultivate - where the suppliers of Nudie Jeans are located. Renewable electricity instead of fossil fuel-driven electricity to lessen the carbon footprint of the products (Nudie Jeans, 2020).

4.2 Interviews Nudie Jeans

4.2.1 Sustainability Manager

Nudie Jeans Sustainability Work

The SM describes that in the beginning, the founders of Nudie Jeans wished to create a stylish product whose manufacturing process would be compassionate both to the environment and to the people. This is also what initially was created, and together with the preferences of employees and other stakeholders they tailored their structure for the sustainability work. As the company grows, however, it becomes increasingly important with a systematic sustainability work not only based on good values and creativity but also e.g., various certifications, policies, and external reporting, mainly to create credibility, reliability, and trustworthiness. The SM explains that with an advisory role, the sustainability department together with the management develops guidelines and frameworks for the implementation of sustainability. One of the features that contribute to the company's uniqueness, is to value long-term goals and value creation rather than short-term goals and profit maximization. The SM empathizes that to be sustainable and to create long-term value includes not only the social and the environmental aspect but also the economic, where a well-disposed economy and making profits is also part of the prerequisites for running a sustainable business and making sustainable investments. Today, Nudie Jeans has grown to become a global

company, the size enables the company to implement sustainable initiatives, but also requires consideration of bigger emissions. Nudie Jeans strives to participate in all activities throughout the supply chain, preferably they wish to “do things themselves” (Sustainability Manager¹, 22-04-19).

Circular activities & Product Innovation within Nudie Jeans

The SM explains that Nudie Jeans puts much effort into circular activities, especially within the store area by focusing on activities such as repair, reuse of old jeans, and secondhand. Nudie Jeans was one of the first to carry out the free repair initiative and in many ways a “first mover” within the circular activities. Today this has become a growing trend, where more brands are offering repairs and recycling indicating these initiatives are attractive. Today the circular initiatives at the store level within Nudie Jeans have grown even more as material management and sorting have increased to thereafter take decisions on how to handle the garments. This creates a clearer overview of the possession of material, further allowing responsibility for the whole product life and solving their sustainability issues with circular initiatives. The SM empathizes the free repair has the initiative to prolong the life of jeans, moreover and beyond the environmental aspects, creating opportunities for additional sales and strengthening customer relationships. For the customers to repair their jeans they must visit a Nudie Jeans store or repair partner, which creates brand exposure and an opportunity for additional purchases. Moreover, customers are leaving their email at the repair service, this enables sending relevant campaigns to customers for example information regarding the washing of jeans to enable a product life. To conclude the repair is an activity that moreover then a positive environmental impact strengthens brand recognition and aims to create customer loyalty (Sustainability Manager, 22-04-19).

The SM explains that the focus is doing most of the jeans in earlier stages, as in the designing stage to enable circular processes. Nudie Jeans has organic cotton as the main fiber and a lot of effort has been taken in this field to be able to recycle. Since such a high percentage of the jeans consist of cotton the process of breaking down and recycling becomes much easier rather than a product consistent with several different components, this further may enable large-scale recycling opportunities. Therefore, Nudie Jeans material choices play an important part in creating the possibility for circular activities. The SM means that Nudie Jeans has the capacity to recycle jeans as the last step to close the loop, but this should not be the first and main action since it comes with challenges within the supply chain such as finding the right collaborators, the mechanical and chemical process, taking the disassemblment process, geographic location etc. Important in this decision is once again Nudie

¹ Informant 1, Sustainability Manager, Nudie Jeans Co., Digital Room, 2022-04-19.

Jeans' aspiration to keep the material within their own brand and deal with their own consequences of conducting business - both from a sustainability angle and maintaining the Nudie Jeans reputation. Examples of Nudie Jeans making their own efforts to prolong the garment's life is through the Ture Recycle Blanket. This initiative is taking care of environmental resources as well as generating income by taking care of material and creating unique products (Sustainability Manager, 22-04-19).

The SM describes Nudie Jeans as a firm with engaged and creative employees within all departments, many with a passion for jeans, and concerning the sustainable framework the staff has to adapt and think in innovative ways. Much focus is also on product development and often together with the suppliers. This is further promoted by stakeholders such as the Fair Wear Foundation (FWF) where the relationship with the purchaser and supplier is made to be more equal dialogue. The SM says that it's a challenge to make the jeans more sustainable, a conversation regarding for example the washing methods enables sustainable production and more responsiveness to inputs from the suppliers within product development. Nudie Jeans further emphasize timeless collections to enable longevity of the garments. Aimed focus on fewer pieces and styles enables more control over processes according to the sustainability profile, allowing traceability and transparency. In the design stage, it is further important to question what brings value to the customers. The SM highlights Nudie Jeans' earlier high focus on new fabrics to the transition to create customer and firm value by focusing on creating value for what the company already possesses and circular activities. Here there is a balance between circularity and the typical view of design. The SM means that to constantly come up with new and expressive designs might be fun from a creative point of view but harder to combine with sustainability and circular activities. This is the reason Nudie Jeans keep to a more timeless fashion and manage resources in a conscious way rather than only responding to trends and ignoring what responsibilities come next. Innovation and product development should therefore create value for the customer as well as be compatible with the existing resources (Sustainability Manager, 22-04-19).

To be active in innovation and technological advancement Nudie Jeans the SM raises examples as *The Material Tool* where they can benchmark their material use to other actors within the textile industry. Moreover, stay updated through different networks such as Klimatrådet (the Climate council), circularity projects, communicate and examine other actors' initiatives as well as stay up to date with legislation. The SM explains that Nudie Jeans values this activeness to continue their development simultaneously as they still value the importance of tailoring and doing the work themselves regarding sustainability and circular activities themselves. In the future, Nudie Jeans might

explore innovation hubs and develop sorting and recycling solutions. But the same goes in this area, Nudie Jeans values finding solutions on their own basis to be authentic and match their brand. There is a need to balance inspiration and keeping the innovation process within the company. The SM explains that within the material field, there are new innovative ways to create a fabric that could be helpful for circular activities, though these alternatives also require a new way of conducting business. While circularity and sustainability are in many ways connected, circular activities do not automatically fulfill all sustainability aspects. There is a balance between adopting completely new methods and improvement of what is already being done, therefore the product development is aimed at cotton and making it as sustainable as possible. Here environmental, economic, and social perspectives of sustainability are enhanced with robust collaborations with farmers that provide a safe, sustainable and traceable cotton production. Moreover, Nudie Jeans is exploring how to improve even more than organic cotton by for example regenerative cotton (Sustainability Manager, 22-04-19).

4.2.2 Nudie Jeans Supply Chain Coordinator

Sustainable development and circular activities within Nudie Jeans

The SC has long experience in the traditional supply chain part and the data system for forecasting demand and production. The current department has a central role in the company by estimating demand and creating forecasts to book fabric. Within this process, the sustainability efforts within Nudie Jeans are further noticeable and connected to decision-making. The SC describes decisions related to the department are in many ways the planning, time, transportation modes, and network within the firm's suppliers and buyers. The transport mode is of high importance from a sustainability perspective and big orders are always considered how to be transported most efficiently. Moreover, decisions such as buying bigger orders often are of environmental concern but then must be considered against the liquidity and the stock value of the company, here the respondent indicates that Nudie Jeans has found a balance. According to the SC the sustainability department also plays an important part in the sustainability work throughout the supply chain and considers aspects such as material and production. The presence of sustainability is noticeable both internally and externally, much focus is on collecting supply chain data and statistics for sustainability efforts (Supply Chain Coordinator², 22-05-02).

² Informant 2, Supply Chain Coordinator, Nudie Jeans co., Digital Room, 2022-05-02.

According to the SC to integrate sustainability within the supply chain planning and lead time are of the highest importance, with a bigger time frame planning sustainable modes are more available to consider etc. shipping on trains rather than by airplane. Being efficient and conscious within these areas enables more sustainable operation through the supply chain and furthers the environmental impacts of Nudie Jeans products. Circular activities are of high relevance in the supply chain but also face some challenges, especially the recycling activities are more complicated to execute. This production must be amenable to different demands from different actors and there are high demands on a functioning and global communication to perform recycling initiatives. Furthermore, some technicalities need to be adapted to the process of recycling and different markets have different needs for recycling initiatives. Moreover, the SC highlights marking different garments within the data systems becomes more difficult when including different fibers and not going under specific categories. The process of recycling is capacity demanding, though it's an important initiative and the department aspires to this kind of project of coordinating recycling in the future. Though there is a need for more improvement in technology and production process, as of right now it's still complicated to achieve the predicted wash on the jeans when the material is recycled. Further the SC means to create closed loops within Nudie Jeans product innovation plays an important part. It's an important component of the Nudie Jeans business to create and develop products that last - can be repaired or found by another on the secondhand market. Furthermore, to be considered in the production and material areas is the demand at the industry level for organic cotton. The fashion industry is becoming more sustainable, which makes the raw material a bit harder to receive as well as a higher price (Supply Chain Coordinator, 22-05-02).

4.3 Interviews External organizations

4.3.1 Research Institutes of Sweden

RISE role in sustainable development

Research Institutes of Sweden (RISE), has the task of strengthening the competitiveness of Swedish companies in the sustainable transition. Through their unique expertise, they enable a variety of innovation processes in almost all industries. The respondent has a long career within the sustainability field with research projects within circular economy and will, henceforth work more frequently with the textile industry. RISE is constantly engaging in the business sector trying to emerge sustainable development and innovation. One way of doing this is engaging with

member companies, such as the collaboration with Nudie Jeans where specialists within the area of chemicals are contributing to evaluating, charting, assessing, and setting guidelines for the future. Through this collaboration Nudie Jeans can access expertise with broad experience and stay on the cutting edge of sustainable business within this field (Researcher RISE, 22-05-04)

Circular Activities in the textile industry

Unlike the linear economy, which mainly focuses on monetary flows, the circular economy appeals to create sustainable flows of resources to nurture both sustainability and economy. Regarding circularity within the fashion industry, it is described as both mature as well exceedingly immature. The major players within the industry who often benefit from economies of scale, have great difficulty with circularity and the implementation of circular activities, simply because the business model isn't suitable. However, companies such as Nudie Jeans which throughout their business model succeed well with both addressing and implementing different dimensions of circularity in several parts of the business, solves several sustainable-related challenges at the same time. They have given themselves prerequisites for circularity since they own and produce a product that is initially more suited for it - thus a more qualitative product that easier gets into a circular system. This is in line with the waste hierarchy which is essential in Swedish legislation and the basics of a circular mindset and illustrates value preservation. Keeping a product as long as possible is what creates the biggest environmental benefit. Despite skeptics, RISE has concluded in LCA's, no matter the industry and the product, the principle of keeping a product and preserving the life span is the best environmental option. This is therefore the principle in the textile industry as well and research highlights the enormous environmental benefit of prolonging a garment's lives. Moreover, Nudie Jeans is following the waste hierarchy through their business initiatives such as repairs, and secondhand (Researcher RISE, 22-05-04).

To retain customers and maintain credibility, it is becoming exceedingly important for all businesses to have sustainable offers and to be able to operationalize those as well and create initiatives that value progressively. At present, the advantage a business's get from circular activities and sustainability thinking is the created brand value. Consciousness is becoming more important among consumers, especially within a generation where consciousness a widespreadly grounded. It is becoming increasingly important to have a sustainable offer and a concrete solution for this offer - this can be to hand in your old garments, rent garment, and have the opportunity to buy second hand. However, there are challenges in re-adjusting for a circular model in terms of profitability, it is central to the linear model and to succeed in switching to a circular model

requires both maturity and timing. Creativity is needed to change models; this move of the "income" is a central issue for all companies. The company probably needs to create new behaviors, and new digital solutions and most likely you need to accept the risk of, for a while, being without the same margins. Above all, companies need to prepare themselves and then try their hand at it, and hopefully, when various regulations are put in place, they have created for themselves the opportunity to quickly switch over. To summarize, it's about timing, preparation, and risk. The re-adjustment is important to retain customers, to maintain credibility, and especially to be part of the starting pit of the circular transition, it is important to start offering sustainable and circular alternatives in all businesses. There is a great risk in not implementing and exploring circular design principles and product development principles as companies' risk "locking themselves in" (Researcher RISE, 22-05-04).

Product innovation & Sustainable Development within the textile industry

Sustainability can be defined according to the global sustainability goals (SDGs) that cover all aspects of sustainability. It includes e.g., also the social aspect of justice issues which circularity does not include at all. Furthermore, circularity is more of a how than a what, i.e., how we can solve a more resource-efficient manufacturing process and flow. Sustainable production and consumption can be measured through the Paris Agreement. It is a clear quantitative measure, which is both established and understandable- it should simply be in line with 1.5 degrees, and preferably below. However, it does not address aspects of chemical and water use, etc., but it is good enough to demand higher ambitions from companies. What is primarily required of companies is that they understand the sustainability issues and their meaning and understand that it is a big change, and it requires a lot. Somewhere, it starts with asking questions such as "*What is a sustainable future for us and what does it mean for our product?*", *What is our ambition? What is our vision?* (Researcher RISE³, 22-05-04).

Certifications and measuring methods are essential for sustainable development. Especially in the textile and fashion industry where there are high tendencies of greenwashing and a strong overvalue of communication. The communication skills within the industry and the capacity to build brands create a perception of sustainability, even if this is not the reality. The strong capacity to create brands is both positive and negative in the terms of sustainable business evolvment. From the positive aspect, a brand can drive sustainability. On the other hand, it can be an uneven distribution of resources where money is spent on the communication department rather than the

³ Informant 3, Researcher, *The Research Institute of Sweden*, Digital Room, 2022-05-04

actual sustainability work, which creates more perception of a sustainable business rather than real action. As a prediction of the future, there is a tendency for more regulations and support to be able to make green claims, here certifications play an important role as well as innovativeness to not fall behind others in the industry (Researcher RISE, 22-05-04).

Cotton is a fiber with a big environmental footprint, so it's hard to know if it's the fiber of the future. However, with the utilization rate and perspective of longevity as a complement to mechanical or chemical recycling of cotton fiber a more decent environmental footprint is achieved. Furthermore, cotton is the fiber field where most research is currently being done on new technologies. So, in this way, there is much to suggest that cotton may remain in the future, especially for such a garment that is used so often, as every day, and throughout a life. One example within the cotton field is regenerative cotton which compensates resources, moreover, this type of cultivation is underway and trendy though for now it cannot be produced on such big scales without affecting the consumer price. Innovation within the area of material and production is critical since here the biggest environmental footprints are created. A prediction of the future materials in the textile industry will probably be the result of an enormous amount of innovation to achieve a lower environmental footprint. To stay updated and in line with sustainable business practices as well as product innovation the respondent at RISE highlights the importance of external analysis of for example certifications and standards, and further staying up to date with the business surroundings. Moreover financial, human resources and time needs to be distributed for creating innovation. Make space for innovation and innovation processes within the firm to stay competitive. Furthermore, it's of the highest importance to use resources well for the structured sustainability work within firms (Researcher RISE, 22-05-04).

4.3.2 The Sustainable Fashion Academy

The Sustainable Fashion Academy's role in the textile industry

The Sustainable Fashion Academy (SFA) express its mission to prepare and equip professionals with tools and knowledge to be able to embark on sustainability while growing its business. The respondent of SFA serves to educate business leaders and managers as well as other parts of the organization to increase knowledge of sustainability within the textile industry. They believe preparation and knowledge to be the main tool for companies to create opportunities to change

their business in the transition from a linear to a circular economy (Director of Sustainable Education⁴, 22-05-17).

Circular activities & Product Innovation within the textile industry

Different circular activities take place at different levels, however, what is believed to be one of the most important activities, is the prolonging of the life of the products. Even if we stopped producing clothes today, we would at least have new clothes on the market for at least a couple of more years. There are different approaches for prolonging the life of the products, however, what is highlighted is the repair initiative where Nudie Jeans is narrated as a pioneer. A garment that lives as long as possible, in its subsistent form, causes the least negative environmental impact, and here the repair initiative plays an essential role to achieve this. Furthermore, the life of products can further be extended through the secondary market. Although, the second-hand market encounters great difficulties in that the supply of secondhand clothes is greater than the demand which results in the life span of the clothes not being extended. Nevertheless, these garments get a low resale value due to the large supply, which makes it difficult for companies to run a profitable business within this area. As mentioned, running a sustainable business, also includes being financially sustainable (Director of Sustainable Education, 22-05-17).

Regarding recycling, and recycling of fibers, it is an upcoming innovation that has not yet been seen to such a large extent, mostly due to deficient technology. Worth mentioning, is that recycling of fibers requires a lot of energy, water and chemicals usage and it may to some extent be more demanding to produce new products with recycled fibers than with virgin fibers, which further results in clothes being made from recycled fibers being expensive on the market. Furthermore, the recycling process is an example for when circularity and circular activities are not synonymous with sustainability since, as mentioned above, requires a lot of energy which further generates large releases of emissions. This does not necessarily mean that recycling is not an option, but as for now it should be considered as the last option. It is, further, an important and essential step in creating a closed-loop system where products, no matter condition, are still watched as resources. Thus, this last step necessitates a huge development of, especially, technology where recycling does not demand the amount of resources it does today (Director of Sustainable Education, 22-05-17).

⁴ Informant 4, Director of Sustainable Education, *The Swedish Fashion Academy*, Digital Room, 2022-05-17.

4.3.3 Göteborgs Stad - Hållbar Konsumtion & Privatekonomi - (GS)

The respondent of Göteborgs Stad works primarily to convey and ignite sustainable alternatives for private consumption. Through displaying different options to consumption and further through replenishing and reflecting sustainable alternatives in an attractive way, they encourage circular activities, further stress and cherish the importance of expansion of a products life cycle (Planning Manager⁵ - Sustainable Consumption, 22-05-09).

Circular Activities and product innovation within the textile industry

The textile industry today is underused with a large abundance of clothing. Although the secondhand market is established within the textile industry as a well-affirmed circular activity and further a way to extend the life cycle of a product, so is it also deficient in the fact that more clothes are handed in than consumed - which becomes a counterweight in the circularity. People want to consume, when it comes to the textile- and fashion industry it is also closely identity-bound and a way for people to create expression for themselves. It is an interest and a hobby for many people, hence the task of finding and creating attractive alternatives becomes increasingly important to cope with a circular transition - here companies have a central role. To extend the life of a product, which is one of the most important aspects of circularity concerning emission disposal. More companies could offer free repairs of clothes and create opportunities for borrowing and renting clothes. Moreover, the activation of the consumer in the consumption, is it important for the consumer to *own the garment* or *wear the garment*? Recycling is also an important aspect of circularity, although the steps for recycling should be used to a greater extent and nevertheless develop. The recycling process within the textile industry relies on the manufacturer producing fabric in a cleaner format where the fibers can be recycled and reused without being an overly large energy-intensive process. Here product innovation and the designing stage of garments becomes in focus (Planning Manager - Sustainable Consumption, 22-05-09).

Sustainable Development within the textile industry

Unlike circularity, which is described as the approach to the transition from a linear to a circular economy, sustainability is explained as the responsibility toward all aspects of the concept, the social, the ecological, and the economic. It is foremost vital to collaborate with sustainability certifications and other external measuring methods as they provide companies with transparency

⁵ Informant 5, Planning Manager, *Göteborg Stad - Institution for citizen service and democracy - Sustainable consumption*, Digital Room, 2022-05-09.

and credibility - which, accompanying other initiatives, is important for activating and enabling consciousness among stakeholders. However, today, there are many sustainability certifications and labels which makes it even more important to choose labeling that is established and independent to enable avoidance of e.g., greenwashing (Planning Manager - Sustainable Consumption, 22-05-09).

4.2.4 Naturskyddsforeningen

The respondent at Naturskyddsforeningen (NF) highlights the importance of changing the current linear economic system into a closed loop of circular economy. To do this, it is important to change consumer preferences and views on resources. Within the textile industry it is of importance to make use of already existing resources and materials, through repair, reuse, and secondhand initiatives. Naturskyddsforeningen here in Gothenburg is engaged in changing consumer preferences and is performing initiatives such as “*Klädbytare dagen*” and repair stops, there is a focus on prolonging the garments’ life. Within some projects of NF, there has been collaboration with Nudie Jeans on etc. Nudie Jeans has contributed with gift cards. In summary the main challenge within creating sustainable business and circularity is changing consumer preferences and awareness (Volunteer⁶, 22-04-25).

5. Analysis

The contributions to Nudie Jeans systematic sustainability work are largely entrenched in the circular activities that the firm has implemented within and encouraged among customers. However, what has occurred to play an essential role within circularity, is the nature and properties of the product, to enable the closed-loop system. Product innovation, therefore, becomes significant in the analysis of how the circular activities within Nudie Jeans align with sustainable development. Therefore, the analysis of the empirical result and its connection to the conceptual framework will be divided into; circular activities, product innovation and sustainable development.

5.1 Circular Activities within Nudie Jeans

Circular activities can function as tools for creating and obtaining a circular economy that further aims to serve sustainable development. What is clarified by not one, but all external organizations within the empirical results, is the significance of working from several dimensions with circular

⁶ Informant 6, Volunteer, *Naturskyddsforeningen*, Digital Room, 2022-04-25.

activities to correspond with sustainable development. Within the technical cycle of the circular economy, products are kept in circulation through repair, reuse, remanufacture, and recycling to prevent waste (*see 2.1*). According to the SM and the SC, Nudie Jeans is striving to be a leading company within sustainability and is further referred to as pioneers by e.g., SFA and GS as well as described as a firm that serves and creates a role as an inspirer to how they use circular activities to align their business with sustainable development.

As a first step to prolonging the life cycle of the products in the using phase, Nudie Jeans uses communication toward the customers when they buy their first pair of jeans. The communication is referred to as the washing guide (*see 4.2.1*) and serves to provide information and instructions about how to make their jeans last as long as possible as well as a way to save on water usage. The washing guide coincides with the second level within NRBV, product stewardship. By creating intangible resources (knowledge) within customers' spheres and thus, relying on cooperation with customers, Nudie Jeans creates a capability that serves the role of lessening the water usage as well as a way to prolong the life of the product which both serve as components to reduce environmental burden.

Further, Nudie Jeans was one of the first to carry out the activities such as free-repair, which especially, *GS, and RISE* press the importance of since it is a simple, primary, and basic mindset for circularity and further an illustration of value preservation. The action is aligned with the framework of the Waste Hierarchy, especially the stage of waste prevention. Waste prevention is achieved, naturally, through as less creation of waste as possible, which the theory describes is achieved through that the purpose of the product gets repeated. The free-repair initiative of Nudie Jeans, moreover, contributes to improved resource efficiency through reduced material use, energy use, and water use. Since Nudie Jeans has developed the free-repair initiative for several years, this has naturally given rise to what NRBV describes as human- and intangible resources. Human resources refer to skilled employees, and intangible resources refer to skill, reputation, and brand name. This concept is highly applicable to Nudie Jeans. Referring to the SM, having worked with those initiatives as long as Nudie has done, has both given rise to the company establishing its name within sustainable operations (brand name), attracting the “right” employees (skilled employees), and furthermore they had the ability and time to create well-founded skills.

For some time, Nudie Jeans has as well worked with selling products on the secondary market. Their take-back facilities offer the customers 20% off their next purchase when leaving their old pair of jeans back at a Nudie store. Depending on the condition of the product, Nudie Jeans either

chooses to reuse it, recycle it or sell it on the secondary market. Second-hand sales align with the above-mentioned Waste Hierarchy and the value preservation of waste prevention. However, it aligns as well with the second strategic level on the NRBV. Product stewardship describes the importance of relying on external operations for creating new capabilities as take-back facilities. The awareness and action of the customers become central to this since we entrust them to return the fabric. At present Nudie Jeans chose to handle the take-back facility themselves and does further not need to rely on external operations, however creating awareness of fabric-return among customer will remain essential. Another aspect of the secondary market, and a working process within GS and also SFA, is to make that market more attractive. GS means at present, there is a major problem with more clothes being submitted to the secondary market than what is sold. Efforts could be making the market more attractive, e.g., encouraging renting of clothes rather than buying.

The phase of remanufacturing is significant for withdrawn garments, so used to not be able to be sold in the secondary market. Regardless of the condition of the pair of jeans submitted, Nudie Jeans works with assembling them in terms of repairing, cleaning, and sorting to allow them to come into use within other contexts. This is specifically aligned with the stage within Waste Hierarchy named preparing for re-use. According to the definition, products have already become waste, however, through diverting the products and saving whole pieces of useful fabric, they create the ability to use the whole pieces of fabric within another production (still within the company) and further prolong the life of the garments (or at least some parts of the garment). The aspiration is to keep the material within their brand and partly deal with the consequences of conducting business as well as be watching the fabrics resources rather than waste. Through this, the firm creates an opportunity to once again generate income, which aligns with the NRBV through valuing tangible resources and further creating new capabilities within product stewardship by redesigning the value chain. A further note, which may be applied to all the above circular initiatives within Nudie Jeans, is the intangible and human resource of knowledgeable employees which creates the ability to prevent waste with actions such as repair for re-use, repair for resale, remanufacturing, and lastly, preparation for recycling. Such resource fulfills all requirements of the resource definition within NRBV; it is valuable, rare, inimitable, and non substitutable and it is certainly a beneficial component to Nudie Jeans success.

What is highlighted by the external organizations is that no matter the industry or the product, keeping a product and preserving its life-span is always the most advantageous environmental

option. However, to continue transitioning from a linear economy to a circular economy, recycling is a necessary step. However, what is highlighted by SFA, recycling and especially fiber-fiber recycling requires a lot of energy usage. Nudie Jeans is currently searching for different alternatives for enabling the recycling of jeans whereas the central challenge is to be able to separate the fibers within the garments to recreate new products. Following the NRBV and Hart & Dowell's more recent view of product stewardship, intangible resources such as meeting new technology for recycling processes are necessary as well as collaboration with external partners. For Nudie Jeans, as a primary stage, it is the ability to separate the jeans material from other details such as zippers and buttons. The SC tells that such work and established partnership are considered important, however, the process is still under development where one values long-term partnership rather than the achievement of such initiative by tomorrow. This is further an example of what the NRBV refers to as the *development of new capabilities* whereas the new capability is a combination of firms' different and specific tangible, intangible and human resources.

5.2 Product Innovation within Nudie Jeans

Product innovation is described as a new product, changes in the current design, or, using new techniques in current production and can emerge internally dependent on resources, capabilities, technology, and knowledge (*see 2.2*). Following the concept of SOI (*see 2.1*) the product should lead to environmental and (or) social benefits compared to the prior version of the product. The life-cycle approach (LCA) is taking into consideration all from the extraction of raw materials to the end of life. LCA can function to stimulate changes in product design where environmental impact over the whole life cycle is considered from the beginning (*see 2.1*). This is strengthened by RISE which states that a more qualitative product is easier to get into a circular system. Firms that improve their products from a sustainability perspective have also given themselves prerequisites for circularity. Actions such as a uniform choice of material given the possibility of recycling and the avoidance of trends can maintain garments' timelessness. The SM and SC highlight that to create closed loops within Nudie Jeans, it's important to create and develop products that last - can be repaired or reused (*see Figure 1*). From the SR, SM, SC, and the external organizations the importance of product design and innovation is emphasized for circularity. Hence this proves the role of product innovation as a constituent of circular activities to facilitate businesses' alignment to sustainable development (*see Figures 1,2*).

RISE explains that cotton is a fiber with a big environmental footprint, however, the utilization rate and longevity make it a more decent one. In line with the waste hierarchy and the NBRV

improvement within the cotton field to utilize resources, making improvements for a longer product life cycle becomes of relevance for sustainable development. When Nudie Jeans uses cotton, the focus is on sustainable options with certifications (*see 4.1*) such as GOTS, USDA, or OSC. According to RISE and GS certifications and the use of measuring methods are essential for products and sustainable development. Especially in the textile and fashion industry where there is a high tendency for greenwashing and where certifications can provide transparency and credibility. The sub-goals for organic cotton within Nudie Jeans were reached in 2012 for denim and in 2017 for the rest of the products. In 2020 Nudie Jeans garments are consistent with 94 % of organic and/or Fair Trade, reused, recycled cotton by total fiber use. Where 70 % is what is classified as sustainable according to the *Material Tool*. This indicates NRBV intangible resources in the form of company-specific knowledge leading to the creation of capability, creating learning curve advantages (*see 2.2*). Moreover, indicating Nudie Jeans taking their product improvement further than pollution prevention and toward product stewardship and sustainable development where the whole product life is considered and minimization of environmental impact.

Since virgin cotton still is resource-intensive the environmental impact could be decreased by making use of cotton already in circulation, further SM emphasizes that the material should be seen as a resource rather than waste. This is within the product innovation field done in recycling initiatives from material both internally and externally as well as pre-consumer and post-consumer, which can be derived from the NRBV of intangible assets as skills and knowledge within the field. This is in line with the NRBV strategies of decreased environmental burden as well as the waste hierarchy' waste avoidance by limiting unnecessary consumption. SFA is pointing out that recycling of fibers is an innovation that has not yet been seen to a large extent due to deficient technology and recycling of fibers requires a lot of energy, water, and chemicals usage. The SC realizes this as well and highlights the importance of new technology to perform these efforts even more efficiently. Tough Nudie Jeans has in many ways through product innovation created the prerequisite for recycling. With such a high percentage of garments consisting of cotton, the process of breaking down and recycling becomes much easier than different fibers and enables large-scale recycling opportunities. This fiber-fiber recycling is highlighted as important by SFA to create less environmental impact in the recycling stage.

Nudie Jeans focus on timeless collections, enabling more control of the material and production allowing traceability, transparency, and continuous improvement. A more detailed production - following pollution prevention contributes to lessened waste and better utilization of inputs.

Furthermore, it's in line with the waste hierarchy, the strict avoidance of waste as limiting unnecessary consumption by the design of products. Here product innovation becomes of interest. The return and use of resources to the supply chain requires the creation of new capabilities and collaboratively with external partners. This is performed through Nudie Jeans' many partnerships such as RISE, SFA, and REACH. For a product to achieve a low environmental burden during its life cycle, product design needs to etc. avoid toxic chemicals - e.g., through the REACH collaboration. In the challenge of water-intensive denim production, focusing on organic cotton agriculture, water resources are more efficient (*see 4.1*) Within the manufacturing process Nudie Jeans suppliers developed a new technique of dyeing, *Save Blue Concept* (*see 4.1*), and decreased water use, which further shows new capabilities and product innovation through partnerships. Moreover, the SM mentions focus on product development and often together with the suppliers, as through collaboration with FWF. A constant conversation with suppliers enables product innovation within materials and production for a more sustainable product. To further enable product innovation the importance of external analysis of the industry and technological advancements is highlighted by the SR, SM, RISE, and SFA. RISE means that in order to develop within sustainability firms need to stay updated with sustainable business practices as well as product innovation. Moreover, financial, human resources and time needs to be distributed for creating product innovation and managing waste. This further aligns with the NRBV tangible resources and within the product stewardship strategy which highlights the importance of meeting new knowledge and technology for achieving more circular activities within the supply chain. Moreover, Nudie Jeans is staying updated through *The Material Tool* (*see 4.1*) which readjusts following the definition of sustainable fibers and enables benchmarking fiber use. This gives great insight into new fibers, the industry, and sustainability standards. Moreover, *The Material Tool* helps Nudie Jeans to follow SDGs by creating manageable guidelines for the product developers and in line with the NRBV, it creates intangible resources in the forms of skills and knowledge within the material field. In accordance with the strategic level of pollution prevention, this enables material substitution and material innovation.

5.3 Nudie Jeans alignment with Sustainable Development

Sustainability is defined as "*Meeting the needs of the present without compromising the ability of future generations to meet their own needs*" and sustainable development is the activities to get there (*see 2.1*). For a firm to align with sustainable development, it is naturally required for them to relate to both the ecological, social as well economical aspects of sustainability.

Economic sustainability is pinpointed by the SM, whereas it is described as a prerequisite for

running a sustainable business and making sustainable investments. This aligns with the framework of NRBV whereas a well-disposed economy is affirmed as an essential tangible resource and further an important component of capabilities within pollution prevention and product stewardship within NRBV.

Life-cycle approach (LCA) is used to overview the effects over the whole product's existence sphere - all from the extraction of raw materials to the end-of-life of the product (*see 2.1*). Nudie Jeans reflects this in the SR from material components followed by initiatives within the user phase such as the washing guide and repair shops. Later, secondary markets and downstream activities such as recycling. The third *NRBVs strategy sustainable development* aims to connect pollution prevention and product stewardship moreover decrease the total environmental burden that comes with the firm's growth. The goal is to attain the production of a product that can be continued endlessly in the future. This could be referred to as similar to the definition of sustainability (*see 2.1*) and taking care of resources. Today Nudie Jeans has grown to become a global firm, the size enables sustainable initiatives, but also requires consideration of bigger emissions according to the SM. Nudie Jeans strives to participate in all activities throughout the supply chain to control and fulfill sustainability efforts. Within the SR and section of Climate Impact (*see 4.1*) Nudie Jeans describes the importance of taking responsibility for all emissions caused throughout the supply chain of their products. The SC describes planning (*see 4.2.2*) as an important action for the reduction of indirect emissions, e.g., selection of transports. This mindset and actions show the presence of the *NRBV strategy sustainable development* to decrease environmental impact simultaneously with growth.

Nudie Jeans locate their largest environmental impacts within the raw material stage as well as within the production. LCA can stimulate product design in this stage to decrease the environmental impact over the whole life cycle (*see 2.1*) Here circular activities (*see 2.1*) and product innovation (*see 2.2*) play importance to mitigate environmental impacts and take more responsibility for ecosystems and biodiversity. A sign of sustainable development in accordance with the NRBV is the interest in improving the material and fiber use, and further design for longevity through garments that can be repaired and reused. Nudie Jeans main fiber is organic cotton, and the overall cotton use is organic, Fairtrade, or recycled. Moreover, the SR connects the choice of organic cotton to the SDGs; *SDG 12, Responsible production and consumption, SDG 13: Climate Action. SDG 9: Industry, innovation, and infrastructure, SDG 17: Partnership for the goals and specifically (see specific targets 4.1.2)*. This indicates Nudie Jeans strives to

continuously improve and lessen environmental impact within the material area and further direct aim at sustainable development through the SDGs. Nudie Jeans use of cotton follows the Waste Hierarchy's waste prevention and the NRBV where resources are used most efficiently and environmental impact is reduced. This is represented for etc. water usage, greenhouse emissions, and chemical use, all for which Nudie Jeans is accounting and reporting within the SR. Forms of strict avoidance of waste such as limiting unnecessary consumption and design of prevention. Cotton is a fiber with a big environmental footprint however the utilization rate, certified, and organic cotton as well as a perspective of creating a decreased environmental footprint, are measures taken by Nudie Jeans. Within the material field, the emergence of new innovative fibers could be helpful for circular activities. Though circularity and sustainability are in many ways connected, circular activities do not automatically fulfill all sustainability dimensions. According to RISE and SM sustainability can be defined according to the SDGs and it includes e.g., also the social aspect which circularity does not. Sustainable development is complex and therefore a potential switch of fiber creates changes in the supply chain where sustainability dimensions must be considered.

Furthermore, circularity is more of *a how* than *a what*, it may be considered as a function or a tool to make the performance of the company align with some of the sustainable dimensions, e.g., by making firms more resource-efficient and thereby, lessening the environmental impact of the products. What is pinpointed and recurs throughout the research, is the significance of the prolonging life of the products, which aligns with as well LCA as waste prevention within the Waste Hierarchy. To prolong the life of a product, different approaches should be considered, however, the prerequisites for longevity are the material, fibers of the material, and design. The timelessness of a product design makes it less sensitive to the cycle of trends, this is something Nudie Jeans regards highly and can be seen in their way of choosing to long-term plan their collections. Repair is usually defined as the primary step for life cycle extension in the user phase and refers to the customer that chooses to repair a piece of garment rather than throwing it. The *design* of the product once again becomes important to create motives for the customer to regard this option as attractive.

To further provide products with longevity, different dimensions of reuse are considered to be the next step. Take-back facilities or other options where the purpose of the products can get repeated, e.g., through secondary markets, are highly watched. Nudie Jeans offers take-back facilities regardless of the condition of the product, as well as an opportunity for the customer to buy

second-hand jeans. Those initiatives align with, repeatedly, waste prevention within the Waste Hierarchy as well as the primary level of NRBV - pollution prevention. However, an aspect that increases in importance within circular systems, and in this case also within sustainable development, is the point of viewing all products as resources that align with the view of tangible resources within NRBV. Referring to the SM, this is also described as working progress within Nudie Jeans, that all products, regardless of condition, are something they have paid for and should therefore be acknowledged as resources.

The above view of resources leads us into the remanufacturing process. As Nudie Jeans chooses to view all products as resources this also provides an opportunity for a longer life for withdrawn products without the possibility to be sold on the secondary market, through being remanufactured. Remanufacturing often refers to products that have been redesigned by already existing material and whole pieces of fabric. This becomes important to mention since activities favored by both circular economy and sustainable development, are activities that preserve value through lessening the usage of energy, labor, and materiality. Remanufacturing does not lessen the usage of labor, however enabling new life of already existing fabrics through a new product, it lessens material usage as well as energy usage (compared to if the product would be produced by new fabric). Furthermore, Nudie Jeans drives innovative work for managing fiber-fiber recycling which is nevertheless an important aspect to achieve a system that aligns with the circular economy. Referring to the above, the material and the components of the material play an essential role in achieving this (*see 4.2.1.2*). However, what has been repeated throughout this research, is that less creation of waste is the most important action within sustainable matters for circularity. However, within this stage, waste has already been created which further leads us to the stage of *preparing for re-use* within waste prevention which serves the role of preparing products through e.g., cleaning and sorting to allow them to come to use in other contexts. Nudie Jeans does work with the process of managing their products in order to be recycled, but again the shine will light on that products are always more aligned with sustainability when being kept and lived in their original format. This wants to be highlighted to clarify that although recycling and remanufacturing are important factors in the circular process, these steps are secondary for activities that align the most with sustainable development.

Looking at Nudie Jeans circular activities in alignment with sustainable development it's clear that Nudie Jeans has shown sustainability efforts since day one, creating a product that was fair to the environment and people. Today the SM informs that the firm has a systematic sustainability work

of various certifications, policies, partnerships, and external reporting to create credibility, reliability, and trustworthiness. With a focus on long-term goals and value creation Nudie Jeans, through its circular activities, view its products as resources rather than waste all through the product life. Here Nudie Jeans circular activities can function as a guide to how industry in the need of transition can align with sustainable development.

6. Discussion & Conclusion

6.1 Concluding discussion

Based on the problem discussion (*see 1.2*) and the research question this Case study has been conducted with the aim to provide an understanding of which circular activities within Nudie Jeans that align with sustainable development. The hope is to guide firms within the textile industry on what becomes important in the aspect of circular activities to align with sustainable development (*see 1.3*).

Nudie Jeans with focus on long-term goals has since day one aimed for creating products that are fair to the environment and people. Today Nudie Jeans raises the importance of systematic sustainability work with the use of various certifications, policies, partnerships, and external reporting to create credibility, reliability, and trustworthiness. Nudie Jeans further highlight the importance of seeing their products, no matter where in the life-cycle as assets rather than waste.

By focusing on product innovation Nudie Jeans ensures a more qualitative product that is easier to fit into a circular system, hence it creates prerequisites for circularity. Nudie Jeans focuses on producing timeless collections, enabling more control of the material and the production of further traceability and continuous innovation. A more detailed production, in accordance with the NRBV strategies and waste avoidance, contributes to lessening waste and increasing utilization. Cotton which is the main fiber of Nudie Jeans is a fiber with a big environmental footprint, however, the utilization rate, certification as organic and focus on longevity makes cotton a more decent one - as well as efforts towards the SDGs. Actions such as this uniform choice of material give the possibility of recycling. To enable product innovation the importance of external analysis of the industry and technological advancements is highlighted. Here Nudie Jeans create capabilities within knowledge and skills through partnerships and benchmarking material use through *The Material Tool*. The efforts within product innovation have led to that Nudie Jeans garments are

consistent with 94 % of organic and/or Fair Trade, reused, recycled cotton by total fiber use. Where 70 % is what is classified as sustainable according to the *Material Tool*, which proves efforts to align their product innovation with sustainable development.

Concluded, circularity is more of a *how-to* align with sustainable development with a focus on circular activities such as repair, reuse, remanufacturing, and recycling. Independently, these activities do not necessarily contribute to sustainable development, however, together they manage to form a value chain that unitedly may close the loop, achieve a circular economy, and through that contribute to sustainable development. Here the *Sustainable Development Agenda* and the *SDGs* come in handy as guidelines as well as policies to both guide and demand governments, civil society, and firms to grow and develop following sustainable development. As well as the *SDGs* being interconnected and affecting each other to a different extent, the circular activities within Nudie Jeans, inspired to align with the *SDGs* does as well. That Nudie Jeans implements systems and specific activities to align with sustainable development concerning the *Sustainable Development Agenda* and the *SDGs* becomes certainly important to show, prove and inspire firms to manage their circular transition as well.

The empirical result shows the importance of firms offering sustainable and circular alternatives, not only for the environment and future generations but to retain customers, profit, market share, maintain credibility and stay up to date with demands for sustainability. Firms need to start offering sustainable and circular alternatives, by not implementing circular design principles firms' risk "locking themselves in" with outdated practices. Here Nudie Jeans can extract clues on how to operationalize sustainable development for other firms in the industry. Nudie Jeans remains an inspirer, with a product that somewhat is developed to fit into a circular system, moreover, providing circular activities such as repair, reuse, and recycling - where the repair is embedded in the brand identity. Nudie Jeans is today operating worldwide and still manages the values of 20 years ago but operating more complex circular activities.

Many of the activities addressed throughout the research, that aim to contribute to a circular transition and further support sustainable development, can be managed by small as well as large companies, however to a varying extent due to resources and products. Nudie Jeans has shown efforts both in the start-up phase and as the global firm of today. This makes the study broadly applicable, referring to the method (*see 3.1*), generalizability is discussed as a cause of the choice of method - case study. Generalizability is a measure of how useful the results of a study are for a broader context. In the case of Nudie Jeans, whose brand is referred to as a leader within the field,

and as a pioneer within specific circular activities such as repair and take-back facilities. Firms within the textile industry should firstly be inspired and further differentiate and apply circular activities to align with sustainable development.

6.2 Recommendations

Within this researcher's aim within the framework of Nudie Jeans there is much to investigate in their actions and alignment with sustainable development. Due to limitations, the focus has been on circular activities and touched upon product innovations. Moreover, the main aim has been on the environmental dimension of sustainability, and partly the economic. The social dimension is another important aspect of aligning with sustainable development which could be addressed in future research.

What moreover could be of interest for future research to gain knowledge of circular activities' effectiveness to align with sustainable development- especially the environmental aspects would be to dig deeper into fiber-fiber recycling. Recycling and specifically, the possibility of fiber-fiber recycling, where fabric is broken down to fiber level and further woven back into a garment, is an initiative that both Nudie Jeans and several of the external partners affirm as a future opportunity. At present, such recycling encounters some problems in that it requires high energy, water, and chemical usage and then naturally, becomes contradictory to the environmental aspect and sustainable development as the circular activities within the firm aim to contribute. However, those initiatives are not closed for this, rather, on the contrary, Nudie Jeans seeks external partnerships alongside awaiting technology to make such activity a natural part of the company's supply chain. Nevertheless, this is an important step to be able to "close the loop" and achieve a circular economy within the society, which makes the development of this technology and potentially also investments within such initiatives of relevance.

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Appendix A

Interview guide Nudie Jeans - *Sustainability manager and Supply Chain Coordinator*

This is the core of the questionnaire for the internal respondents

Theme: Personal and organizational background

1. Describe your academic and professional background, what is your role now at Nudie Jeans and how has it developed?
2. How is your role and department influencing other departments in the company? How does this influence decision making?

Theme: Nudie Jeans business and Sustainability

1. How would you describe sustainability and how would you say Nudie Jeans works accordingly?
2. Which are the key words in the company and within your role?"
3. Why is sustainability an important part of your company? How has sustainability work changed since the start?
4. How is sustainability work visible in Nudie Jeans? In accordance with the SDGs?
5. How do you measure success and how do you create value as a company?
6. How important is it for the company with external collaborations and certifications?

Theme: Product Innovation and Circular activities

1. Is product innovation and development central in Nudie Jeans?
2. If yes: how would you describe your product innovation and how decisions are made in order to improve within this area?
3. Where and how is innovation created within the business?
4. Do you think Nudie Jeans product innovation and design is affected by external actors, which and how?
5. How do you stay updated to new technology and recycling processes?
6. How do you work with waste management and product life cycle analysis?
7. How does circularity at Nudie Jeans look like?
8. What product innovation and circular initiatives do you think has been most successful for Nudie Jeans? What ideas are behind this?
9. How does the future look? What challenges is Nudie jeans facing within the sustainability field and product innovation?

Appendix B

This is the core of the questionnaire for the external respondents

Theme: Background

1. What is your background, describe your role and the organization
2. How can you in your role and the organization as a whole influence firms to become more sustainable?

Theme: Circular economy and product innovation

3. How would you describe linear economy vs circular economy? Why is the transition important and what role does product innovation play?
4. How does circularity look in the textile industry? Why and how does material and production play a part?
5. What are the threats and opportunities for firms performing circular activities?
6. What are the main important circular activities? - what steps should be in focus?
7. What benefits can firms receive from performing circular activities?

Theme: Sustainability

8. How does circularity and sustainability connect and where do they differ?
9. How do you define sustainability, sustainable consumption and production?
10. How do firms align to all three dimensions of sustainability?
11. What role does certifications and external measurements play for firms?
12. How can the specific material choices and circular activities play a role in sustainability work?
13. How would you describe Nudie Jeans sustainability alignment?
14. How does a firm stay up to date on sustainability - moreover circularity and product innovation?

Theme: Partnership

15. What is your perception of Nudie Jeans
16. In case of partnership: How can your organization influence Nudie Jeans in their sustainability work? - What challenges and what are Nudie Jeans doing well in this area?