BUILDING AN ENVIRONMENTAL SCORECARD FOR THE FASHION INDUSTRY

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ABSTRACT

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Environmental sustainability has been a growing issue in the fashion industry due to polluting production, complex supply chains and overconsumption. This has raised growing pressure from consumers and investors to create sustainable solutions to combat environmental issues within the fashion industry. Even if there are multiple ESG frameworks and sustainability assessment tools, most of them remain too generic for environmental challenges regarding the fashion industry. The purpose of this thesis is to create an environmental scorecard specifically for the fashion industry and to present how sustainable fashion business models rank on a sustainability spectrum.

This study uses a qualitative research design. The data is collected through literature search and expert interviews. The initial indicator set was created from literature by examining current sustainability frameworks such as Global Reporting Initiative (GRI), Higg Facility Environmental Module (Higg Index), Materials Matter Standard (Textile Exchange) and SASB/ISSB Apparel Standard. The scorecard was then presented and refined based on interviews with industry experts. The final scorecard was used to demonstrate its applicability by ranking different sustainable business models.

The results show that the final environmental scorecard for the fashion industry consists of five core indicators: chemical management, circularity and recycling, water usage, carbon emissions, and sustainable materials. The sustainability spectrum of sustainable fashion business models show that biomaterials and innovative fibers together with resale and secondhand are the highest ranking archetypes.

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Ympäristövastuullisuus on ollut kasvava ongelma vaatetusalalla johtuen saastuttavasta tuotannosta, monimutkaisista toimitusketjuista sekä ylikulutuksesta. Tästä johtuen kuluttajat ja sijoittajat ovat osoittaneet kasvavaa painetta alan yrityksille kehittää kestävämpiä ratkaisuja, jotta ympäristöhaasteet vaatetusalalla saataisiin korjattua. Tästä johtuen on syntynyt tarve työkalulle, jolla yritysten ympäristökestävyyttä voi arvioida. Vaikka on olemassa jo ESG -mittaristoja ja kestävyyden arviointityökaluja, suurin osa niistä on liian yleismaallisia mitatakseen ympäristöhaasteita juuri vaatetusalaa ajatellen. Tämän tutkielman tarkoituksena on luoda ympäristövastuullisuusmittaristo kohdistetusti vaatetusalalle sekä esittää miten kestävän muodin liiketoimintamallit sijoittuvat kestävyys-spektrillä.

Tämä tutkielma hyödyntää kvalitatiivista tutkimustapaa. Data on kerätty käymällä läpi kirjallisuuslähteitä sekä haastattelemalla alan asiantuntijoita. Alkuperäinen mittaristo luotiin pohjautuen kestävyysalan kirjallisuuteen, jossa käytiin läpi olemassa olevia kestävyysmalleja, kuten Global Reporting Initiative (GRI), Higg Facility Environmental Module (Higg Index), Materials Matter Standard (Textile Exchange) ja SASB/ISSB Apparel Standard. Tästä syntynyt mittaristo esiteltiin haastatteluissa alan asiantuntijoille ja sen jälkeen muokattiin vastaamaan syntynyttä palautetta. Lopullista mittaristoa demonstroitiin arvioimalla eri liiketoimintamallien kestävyyttä.

Tulokset osoittavat, että lopullinen ympäristökestävyysmittaristo vaatetusalalle koostuu viidestä päämittarista: kemikaalien hallinta, kiertotalous ja kierrätys, vedenkulutus, hiilidioksidipäästöt sekä kestävät materiaalit. Kestävyys-spektrillä parhaiten sijoittuvat liiketoimintamallit olivat biomateriaalit ja innovatiiviset kuidut sekä jälleenmyynti ja käytettyjen tuotteiden myynti.

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DECLARATIONS

Turnitin

The originality of this thesis has been reviewed with the Turnitin similarity checking service.

AI usage

The author of this thesis, Joel Nokkala, used the following AI-tools during the preparation of the thesis:

1. Grammarly
    a. Purpose of use: Checking the grammar of the text while also providing helpful suggestions to increase the clarity of the text
    b. Explanation of the use of the tool: Parts of the text were pasted to the Grammarly website where the tool suggests improvements. Grammar mistakes were fixed and suggestions about clarity were noted but not necessarily used.
2. ChatGPT
    a. Purpose of use: Creating part of the reference list. Creating notes from interview transcripts
    b. Explanation of the use of the tool: The links and writers of the text were given to ChatGPT and asked to create a reference list in Harvard style. Also asked to arrange the references in alphabetical order. Also used to summarize interview transcripts

Responsibility

The author, Joel Nokkala, takes full responsibility for the content of this thesis and has reviewed and edited the content generated by the possible use of AI tools.

1. Introduction

The fashion industry is one of the most polluting industries in the world, and at the same time, it holds a huge responsibility towards our planet and society (Mishra 2025). Matters regarding environment, society, and governance (ESG) have become increasingly important in the last decade as different stakeholders, such as consumers, investors, and governing bodies, have started to demand more responsible and sustainable action from companies. The fashion industry, especially fast fashion, is seen as a catalyst for sustainable actions, as environmental concerns and concern for employee safety are increasingly relevant. This master's thesis thus investigates sustainable fashion and related business models in the light of ESG.

The goal is to create and portray an environmental scorecard, which would help companies and other stakeholders in the industry to estimate the sustainability of their practice more transparently and increase comparability. This fills the need for a clear and standardized scorecard, which is missing in the fashion industry. The thesis also presents different sustainable fashion business models and how they compare in a sustainability spectrum to show what type of sustainable practices stakeholders could adopt to their own operations.

This study focuses on how sustainable solutions and business models can be constructed so that they decrease negative environmental impact. This study also emphasizes the importance of creating a clear environmental scorecard for the fashion industry. Having clear and measurable indicators, companies can more easily understand their sustainability rating and answer the growing expectations from consumers and society.

1.1 Background of research

The fashion industry has evolved drastically in the last few decades thanks to globalization, digitalization, and fast-paced consuming culture. The rise of fast fashion has led to a process that sees new fashion collections being produced faster than ever. On many occasions,

clothes are seen as quickly consumed disposable products. At the same time, the awareness regarding the negative effects of textile production has increased.

One of the main reasons for the increased awareness can be regarded for climate change, which has brought in new demands for all industries to lower their carbon emissions and energy consumption. Companies in the fashion industry are increasingly knowledgeable of regulatory frameworks such as Corporate Sustainability Reporting Directive (CSRD). At the same time consumers demand more transparent reporting models and more efficient sustainability efforts. ESG mindset has created a movement of increased awareness of environmental responsibility, social responsibility, and governance. (Benardo 2023, De Souza Barbosa et al. 2023)

This thesis answers to the demand for a more standardized environmental scorecard for the fashion industry that takes into account general sustainability criteria but also industry-specific qualities such as the diversity of material choices, design, production, and supply chain. On top of this, this study will bring forward different sustainable business models and their similarities and differences.

1.2 Research objectives

The general objective of this study is to increase the knowledge concerning sustainability and responsibility in the fashion industry while, at the same time, promote concrete tools that companies, investors, and other stakeholders can benefit from when making decisions regarding sustainability of their operations. The main research question is:

RQ1: What would an environmental scorecard for the fashion industry look like?

This question is followed by,

RQ2: How do sustainable-fashion business models rank on a sustainability spectrum?

These questions are further divided into three sub-objectives:

1. To create an Environmental scorecard for the fashion industry:
   The goal is to build a clear and practical scorecard that can help companies evaluate and report their own sustainability levels in relation to environmental components. The scorecard is meant to offer transparency and comparability within the industry so that

companies can realize their weaknesses and strengths and find ways to improve their measures.

2. To explain and discuss sustainable business models:
This thesis maps different sustainable fashion business models that are based on previous literature and empirical evidence. These models can be, for example, that rely on circular economy, re-use, secondhand -business and sustainable design and material solutions. The objective is to find out how these business models differ from each other and for what type of companies they fit the best.

3. To identify sustainable practices in the fashion industry
The third objective includes suggesting efforts to improve sustainability within different business models. This means recognizing the sustainability spectrum that recognizes where different sustainable business models are compared to each other on the sustainable–non–sustainable scale. This gives the opportunity to recommend how fashion companies can expand their sustainability efforts even more.

With these objectives, this thesis tries to offer both an academic understanding of sustainable business models in the fashion industry with practical solutions.

1.3 Research gap and conceptual positioning

Current sustainability assessments in the fashion industry show that fashion-specific evaluation requires more specific indicators related to fashion products and supply chains. For that reason, relying on broad, company-level indicators might not be enough to create accurate results. Measures such as environmental impact, material choices, social conditions, transparency and more sector-specific indicators and scoring approaches are needed to make sustainability assessment in fashion more useful for stakeholders in the industry. (Gonçalves & Silva 2021) There are also sector-specific instruments, such as the Higg Index and the suite of Textile Exchange (2025) benchmarking, which transform sustainability into fiber-, facility-, and brand-level indicators. They assign the same level of weighting to all companies regardless of the specific priorities among stakeholders and do not give much insight into how such weightings are derived. The systematic review of the academic literature did not find many peer-reviewed articles that integrate the material specificity of

the apparel-centered instruments with the stakeholder-weighted approach based on the existing ESG theory. The lack of such approach is increasingly important as investors and regulators are becoming more demanding that non-financial reporting should meet clear standards. Otherwise, the ESG measurement tools risk being seen as incomplete or biased. In that regard, the present thesis introduces and empirically tests an apparel-specific, expert-weighted environmental scorecard, thus filling the specified gap by grounding the indicator choice in apparel science but setting the relative importance of indicators by means of systematic consultation with the industry experts.

In the bigger picture of studies regarding environmental sustainability and sustainability in the fashion industry, this study is positioned at the intersection of some of other closely related research domains: ESG frameworks, environmental sustainability in the fashion industry, and sustainable business models. The Venn diagram (Figure 1) highlights each of research domains and sub-domains in each of the cross-sections. Between “Environmental sustainability in the fashion industry” and “ESG frameworks”, there is “ESG frameworks for measuring environmental sustainability in fashion”. This sub-domain includes previous studies regarding, for example GRI, SASB and TCFD. In the cross-section of “Environmental sustainability in the fashion industry” and “Sustainable business models”, you can find “Business models to reduce environmental impact”. This sub-domain highlights concepts of different sustainable business models in fashion such as clothing rental, digital fashion and upcycling. The last sub-domain in the cross-section of “Sustainable business models” and “ESG frameworks” includes a part of this study, where business models in the fashion industry are evaluated based on ESG criteria. In the intersection of these three research domains, lies my “Environmental scorecard in the fashion industry”. This thesis connects these domains by using an ESG-based evaluation logic to different sustainable

fashion business models. Through this, it shows how different stakeholders can evaluate the sustainable performance of business models within the fashion industry context.

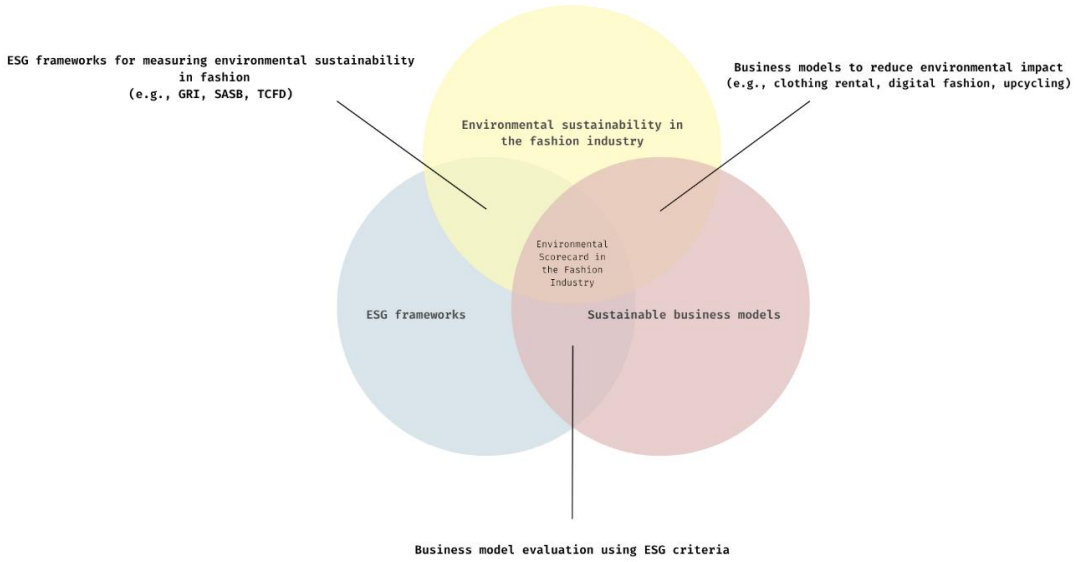

Figure 1. The Venn diagram

1.4 Structure of the thesis

The structure of the thesis is built so that it flows naturally from the theoretical framework and background, after which the methodology, analysis, and results are shown. The end of the thesis will show conclusions and possibilities for further research. The process flow from the start to the results is shown below in figure 2.

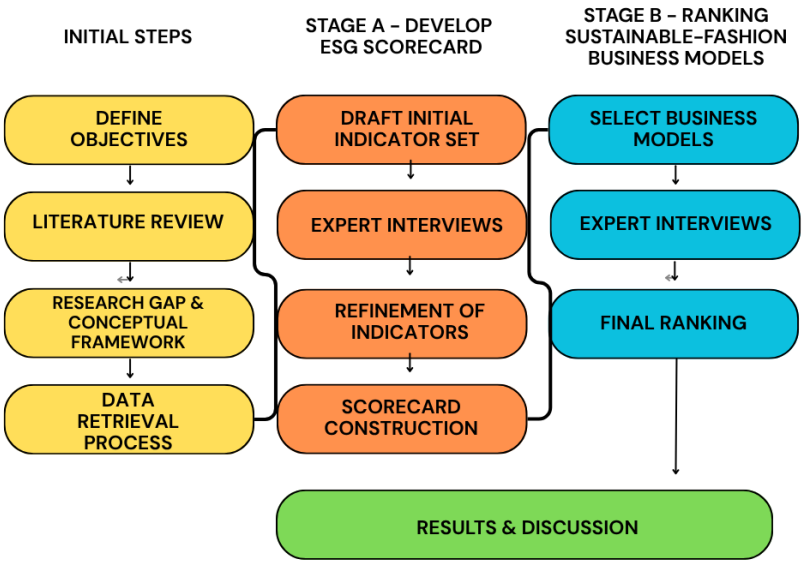

Figure 2. The process flow chart

The thesis starts with initial steps of defining objectives, background literature, discussing the research gap and data collection process. Everything starts with an introduction that creates the background and objectives of the study. In this part, the research questions and motives of this thesis are introduced. After this, the background literature part begins that explains the relevant theoretical ways of approach and previous research and models regarding ESG, fashion sustainability, and the practice of sustainable business. The background literature aims to create a more profound ground for previous studies that this thesis relies on. Then, the research framework and methodology of the study is introduced, where the data used and the methods of data gathering are introduced. This research will be divided into two sections, which are Stage A and Stage B. Stage A will involve the development of the environmental scorecard. The whole process starts with drafting the initial set of indicators derived from the literature. Next, this set of indicators will go through expert interviews, which are used for validating the scorecard but also, gaining important insight on how the initial scorecard v1 could be improved. Through this refinement, the final scorecard v2 will be constructed. Stage B focuses on the ranking of the sustainable business models and arranging them in a sustainability spectrum. This stage starts with the selection of sustainable business models through literature. Then, experts are being consulted about possibilities and obstacles regarding these business models. Based on their answers, the final set of business models are ranked in a sustainability spectrum. In the final ranking, the environmental scorecard is also being used to demonstrate its possible implementation to

rank business model archetypes. The last step of this thesis involves analysis of the results and possible future research opportunities.

2. Background and Literature

This chapter gives an overview of the relevant literature regarding the thesis subject. This chapter delves into ESG, its background, common frameworks, and usage in the fashion industry. The chapter will also explain what sustainable fashion means, its concepts, different business models, and challenges regarding these themes.

2.1 ESG

Environmental, Social, and Governance (ESG) can be viewed as a group of factors that include environmental, social, and governance matters. As shown in many studies, ESG factors may have a significant influence on corporate behavior and the value that a company provides (De Souza Barbosa et al. 2023). Friede, Busch, and Bassen (2015), demonstrate in their study how there seems to be a non-negative relationship between ESG programs and financial performance.

ESG criteria have emerged as an important new paradigm in evaluating companies and making investing decisions in the last few decades. Traditional financial analyses were based on profitability and risks, but the addition of ESG look-up has given a more comprehensive perspective in the assessment of long-term value and impact of companies. The roots of ESG can be traced to wider subjects, such as corporate social responsibility (CSR), sustainable development, and stakeholder theory (Passas 2024). Especially the Triple Bottom Line, introduced by Elkington (1999), expanded the measure of companies' performance outside of financial outcome, also considering social and environmental aspects. This formed a foundation for the formal introduction of ESG criteria (Macneil et al. 2022).

The environmental aspect is evaluated by looking at the company's carbon footprint, resource usage, waste management, impact on biodiversity, and overall energy efficiency. Social aspects include the working environment, relations with local communities, diversity and inclusion, and employee well-being. The governance aspect emphasizes transparent management practices, ethical behavior, diversity of the board, anti-corruption efforts, and securing shareholder rights. By combining these three pillars, the criteria emphasizes that corporations are not only responsible for the interest of shareholders but also for a wider

range of stakeholders, such as employees, communities, ecosystems, and future generations (De Souza Barbosa et al. 2023)

Historically, some researchers have claimed that a company's only duty is to maximize shareholder value (Friedman, 1970). This somewhat narrow perception was challenged by the emergence of the Stakeholder theory, which focused on the interdependence between business and society. Over time, climate change, social inequity, and corruption have highlighted the importance of ESG aspects. This progress has shown the need for even more responsible business practices. (Freeman 1984, De Souza Barbosa et al. 2023)

2.1.1 Frameworks

ESG frameworks have been developed to guide companies with environmental-, social, and governance measurement and reporting. Some widely recognized global standards are, for example, Global Reporting Initiative (GRI) standards, Sustainability Accounting Standards Board (SASB) guidelines, and Task Force on Climate-related Financial Disclosures (TCFD) recommendations. These frameworks describe the indicators and measures through which the companies can report their environmental impacts, social activities, and governance practices. (Yusof & Widyasamratri 2025)

Multiple third-party companies, such as MSCI, Sustainalytics, and Refinitiv, offer ESG ratings. These ratings often combine multiple of ESG indicators into one single score or rank, which helps investors and other stakeholders evaluate and compare a company's sustainability performance. Each of the agencies has their own approach in which they put emphasis on various elements or give more importance to specific ESG factors. Even if these evaluations can be useful, they are not standardized between agencies, and different indicators might be evaluated with differing views. As an example, labor practices indicator in one rating can be evaluated by the basis of workforce turnover and in other rating based on labor-related court cases taken against the firm. (Berg et al. 2022)

Materiality is one important concept regarding ESG frameworks. Especially when ESG issues are assessed from the financial relevance perspective. Financially material factors in ESG are those factors that might affect company’s operational performance, financial risk profile or investor decision making. In the fashion industry, issues related to raw material

sourcing, water usage, labor conditions, and transportation are particularly important. Many times, ESG frameworks that are based on financial materiality such as SASB encourage companies to prioritize those aspects that are most important for their specific industry (Madison et al. 2021; Niinimäki et al. 2020).

2.1.2 ESG Scorecard

Environmental, social, and governance (ESG) criteria have become an important part of corporate evaluation as well as sustainable investment strategies and in the overall activities of responsible business performance. ESG scorecards are systematic tools which can be used to measure the performance of businesses in each of the three ESG areas. Such scorecards make it easier to compare various entities, industries, and geographic areas because they are given a structured framework for evaluating non-financial indicators (Yusof & Widyasamratri 2025).

The introduction of environmental, social, and governance (ESG) frameworks is one of the effects of the rising recognition that non-financial factors have a material impact on long-term financial performance and risk exposure. The stakeholders, including investors, employees and customers, increasingly demand ESG policies and practices from firms. (Beretta et al. 2019). In this respect, ESG scorecards offer a common reporting and evaluation performance basis and tend to be aligned to such standards as the Global Reporting Initiative (GRI), the Sustainability Accounting Standards Board (SASB), and the Task Force on Climate-related Financial Disclosures (TCFD).

Most ESG scorecards are structured around three main pillars; Environmental, Social and Governance. The environmental dimension focuses on common environmental challenges such as carbon emissions, energy use, water consumption, waste management, and the sustainability of materials. The social dimension covers, for example, labor practices, diversity and inclusion and human rights. The governance dimension reviews corporate oversight, such as who is on the board and how diverse it is, executive pay, shareholder rights, transparency, and anti-corruption measures. In the rating of a company on its ESG performance, analysts tend to sub-categorize the indicators, score each of these categories assigned, and aggregate them, normally through weighted averages, to obtain their pillar scores and overall ESG rating. Nevertheless, there is not a standardized approach that is

applied by analysts as the large research firms often have their own scoring model. (Yusof & Widyasamratri 2025)

Consider MSCI, Sustainalytics, and Refinitiv. They all unveil their own branded ESG scorecards that contain a different combination of metrics, sources of data, and weighting systems. Such a difference in grades makes it difficult to evaluate the grades of one agency compared to another, much less settle on the actual ESG of any one organization (Berg et al. 2022).

ESG standards like the SASB standards, which are currently under the International Sustainability Standards Board (ISSB), can be quite sectorial in nature, and thus, they are effective in sector-based scorecards (ISSB 2023). The apparel industry has its own peculiar ESG issues, like labor standards in supply chains and environmental implications of textile manufacturing, that could be left unaddressed by generic scorecards. (Gonçalves et al. 2021; Niinimäki et al. 2020)

Although there is an increase in the use of ESG scorecards, these have been criticized on accusations of failing to be transparent and being too subjective. The fundamental problem lies in the fact that there is no agreement on the aspects that should be measured and how. What is more, data availability and quality are usually not sufficient, particularly in fields with sophisticated supply chains or in developing markets. There is also the problem of so-called greenwashing, where the performance of ESG is exaggerated or simply masked by reporting. This concern supports the case of having strong, transparent, and third-party audited ESG metrics in order to have credibility from the investor side. (Dobos & Éltetö 2022; Jambor et al. 2023)

For companies, generic ESG tools can provide a useful starting point, but assessment tools in the fashion industry must consider also sector-specific environmental issues. For example, the Higg Facility Environmental Module (HiggFEM), which is developed within the Higg Index framework is designed for apparel and footwear sector. It evaluates areas like environmental management, energy use, greenhouse gas emissions, water use, chemical management and waste management. All of which are relevant for textile and apparel production when considering major environmental issues within the industry. (Shamsuzzaman 2023)

In modern corporate governance and sustainability practices, ESG scorecards cannot be ignored. Regardless of the design and use differences, their main purpose is to provide consistent, and actionable information on the ESG performance of a firm. The path of ESG scoring will be characterized by involving industry-specific modification and constantly raising the level of transparency in the data. (Gonçalves et al. 2021; Jambor et al. 2023)

2.2 ESG in Fashion Industry

The fashion industry that covers clothing, footwear, and accessories is determined by a complex global supply chain and vast usage of resources. As a polluting industry, implementing ESG considerations is especially important and urgent. From the point of environment, the industry uses a lot of water, chemicals, and energy in the manufacturing processes. Also, high greenhouse gas emissions and textile waste are creating concerns. In addition, the concerns in social responsibility are seen in many of the employees working in producing countries, which often are considered developing countries that offer cheaper labor forces. Many of the employees often have low wages that don’t cover living costs and possibly no working rights at all. The issue of governance often coincides with the complexities of the subcontracting and outsourcing activities that are typical of modern service delivery. (Gonçalves et al. 2021; Niinimäki et al. 2020)

To answer these dimensional challenges, many of the companies in the fashion industry have begun implementing ESG frameworks and indicators. As an example, Sustainable Apparel Coalition's Higg Index was created to help brands and retailers measure the environmental, social, and governance impacts. These tools are a set of measures that would allow constant improvement of organizational practices. However, there's no requirement for companies to implement these efforts, which is why usage and transparency vary significantly between different companies. (Shamsuzzaman et al. 2023; Yu et al. 2023)

The pressure on the shareholders has also increased. Both big public fashion concerns and smaller private brands are being evaluated by sustainability criteria, socially responsible investors (SRI), and mainstream fund managers. The scandals that occur in the open regarding unethical supply-chain practices have the ability to destroy the reputations of corporations and influence their financial performance. On the contrary, strong ESG

performance can improve a company's image, increase customer loyalty, and decrease long-term risks (Köksal et al. 2017; Steindl 2024).

Even if there have been improvements, the fashion industry still has a lot of structural issues regarding the implementation of ESG practices in the whole supply chain. Especially with social sustainability, many of these issues are related especially to the collection of data and verification in subcontracted factories and farms in multiple countries, each with their own regulatory standards. Even with these challenges, connecting ESG principles to brand identity has been an important differentiator for companies. Those who have been able to integrate ESG principles successfully have been better at controlling the risks regarding their image and also better at serving ethical consumers. (Köksal et al. 2017)

2.3 Fast Fashion

Fast fashion refers to a business model that is fast in manufacturing cheap clothes in line with the current trends so that consumers can keep changing their wardrobes. Its usage became widespread with the introduction of brands like Zara, H&M, and Mango, which transformed the usual cycle of the fashion industry by providing several micro-seasons per year instead of sticking to a few collections per year. Although this has made fashion more accessible and spurred growth in the global apparel market, it has also led to the emergence of severe sustainability issues. (Niinimäki et al. 2020; Nizzoli 2024)

A short product life cycle is one of the characteristics of fast fashion. Pursuit of speed and quantity may cause quality to be compromised, and the lifespan of the garments becomes shorter, which later finds its way to landfills or into incinerators. At the same time, the concept of fast fashion is closely connected with the overconsumption trends, which prompt people to buy more clothes than they actually need. In the environmental aspect, raw materials, especially cotton, may require a lot of water, pesticides, and chemicals, and the dyeing and finishing of the clothes may contaminate water sources in developing countries. The social aspect is also quite complicated. The necessity to manufacture garments at progressively decreasing prices leads to awful working conditions, particularly in those countries where labor regulations are weak or are not followed. (Niinimäki et al. 2020; Nizzoli 2024)

From an ESG perspective, fast fashion is often mentioned as one of the least sustainable areas in the fashion industry. The business model based on high turnover, low-cost, and international outsourcing usually conflicts with ESG principles based on the long-term value creation, the responsible use of resources, and the defense of the rights of workers. Certain fast fashion companies have launched green projects to meet pressure on increased responsible production on the side of consumers. Examples being recycling programs or so-called conscious collections. Critics believe, though, that such attempts are at risk of being covered under the greenwashing label when the fundamental business model is based on the production of large quantities of disposable clothing (Serrat et al. 2025).

However, it must be mentioned that fast fashion companies do have the ability to use their size and resources to create positive change across the industry. For example, some companies have initiated mass take-back of used clothes and invested in more efficient production technologies (H&M 2025). It has yet to be answered whether these efforts have the capacity to counteract ingrained issues within the fast fashion paradigm or whether consumer demand, policy, and competitive structures need to be approached more comprehensively.

2.4 Sustainable Fashion

Sustainable fashion is a rather vague term that includes a wide range of different practices and approaches that seek to reduce the environmental and social impacts of the fashion industry. It is also referred to as ethical fashion or eco-fashion. Sustainable fashion contains the whole lifecycle of garments. Meaning that everything from raw materials to production, consumption, and disposal should be taken into account. Sustainable fashion practices also mean seeking ways to minimize negative consequences at each of these different stages (Henninger et al. 2016)

According to Niinimäki et al. (2020), one of the main issues in fashion industry's sustainability is the environmental impact that is associated with textile production. For example, greenhouse gas emissions, water pollution, and resource depletion are big concerns. Fast fashion is one of the most important causes of adverse environmental effects, and this includes changing trends and cheap garments at a fast rate. As fast fashion is

produced in extremely high volumes and the life cycle remains short, the resources needed in production are high. Nevertheless, with the development of fast fashion, there has also appeared a new trend known as slow fashion over the past few years. Slow fashion promotes more durable and quality clothes that are designed sustainably in the first place. (Niinimäki et al. 2020)

Sustainable fashion also means that the company considers social and ethical considerations. These are, for example, safe working conditions, fair labor practices, fair trade and artisanal craftsmanship. Especially in the context of the global fashion supply chain, this aspect of sustainability is important. (Fletcher & Grose 2012).

The primary motive for sustainable fashion trends is consumer preferences and awareness. In modern times, consumers are more educated about the environmental and social consequences of their clothing choices, and this motivates them to choose brands that focus on sustainability and ethics (Bumin 2024). Due to such changes in consumer patterns, new business models and market niches have emerged, like the use of recycled materials, upcycling, and clothing rental services. (Niinimäki 2018).

As of late, the fashion industry has also seen major regulatory and policy interventions. Policies such as compliance with International Labour Organization (ILO), public sustainability reports and sustainability labels are gradually being brought into force by governments and business companies. However many of these initiatives lay in the shoulders of companies and usually do not apply for the whole supply chain, which makes the transformative power of these efforts weak. (Dobos 2022).

2.4.1 Business Models in Sustainable Fashion

There has been an increase in the development of various innovative business models that are trying to answer environmental and social concerns while still maintaining financial viability (Niinimäki et al. 2020). This section will go through some of the most relevant innovative business models. These models are rental and subscription services, made-to-order production, virtual and digital fashion, local and transparent production, take-back service, repair service, upcycling, resale and secondhand, biomaterials and innovative fibers

and circular fashion. The archetypes target each of the ESG hotspots, overproduction, textile waste, labor opacity or material toxicity.

Circular fashion is a business model with main focus on minimizing waste while maximizing the lifecycle of garments by using practices such as recycling, upcycling, and the use of closed-loop production systems. Circular fashion companies should make their products in such a way that they can be disassembled easily to reduce their environmental impact and make new value out of the old ones. Circular fashion can also be seen as an umbrella concept for many of the fashion business models. (Niinimäki 2018).

Rental services work by charging per use of clothes, as opposed to per ownership. The environmental benefits depend drastically on reaching the high utilization levels and low-impact logistics. Life-cycle assessment models reveal that the emissions related to the reverse logistics may undermine such benefits in case transport distances or laundering procedures turn out to be overly long (Johnson 2021). Rental services can work by renting for a single event or as a subscription service, where the company usually offers a certain amount of clothes to be rented in month. These subscriptions usually come at a lower price than when renting the same clothes as separate pieces. According to Bodenheimer et al. (2022) rental clothing can be used as a way to make consumers use single clothing items more often, compared to traditional ownership. This in turn works as a great counteract towards fast fashion. The positive sustainable benefits depend on how many new purchases are replaced by rental clothing.

Depop and Vinted are good examples of peer-to-peer marketplaces that allow reselling of old clothes and at the same time lengthening the life of a clothing brand as the clothes stay in circulation for a longer time. A similar business model is take-back programs that are used by some brands to increase the lifespan of their own products. Study by Gray et al. (2025) suggests that especially online resale models can decrease the environmental impact of clothing purchases significantly. Largest improvement being the reduction of greenhouse gas emissions.

Upcycling services can help reduce waste by turning leftover fabric or old clothes to new,

more valuable products. Based on experiments as much as 50% to 80% of fabric leftover could be used to upcycle into new garments. However, for upcycling to be beneficial in industrial level requires understanding of how to design garments efficiently to suit the production system. (Aus et al. 2021)

Made-to-order manufacturing aligns supply and real demand and hence reduces the deadstock. The Ministry of Supply makes use of 3-D knitting robots, which make a seamless sweater in about 90 minutes after an e-commerce order is made. This virtually eliminates cutting waste and minimizes the risk on inventory. However, bigger retailers are sceptical about scalability of such innovation as the time for a single garment to be ready for customer still takes several days. (Halzack, 2017)

Local production refers to manufacturing products in close geographical proximity to the point of consumption. The model is considered sustainable as close geographical distance between the place of production and place of consumption amounts to shorter transportation and thus smaller emissions. Also depending on the production country, it can mean that certain regulations are expected to be met just by knowing that the production is in local area (Sustainability Directory 2026). Transparency initiatives reveal precise cost-break downs and factory locations, which, in turn, allows civil-society to verify labor situations. Companies like Everlane publish audited cut-and-sew facilities for each SKU and open the transparency of supply chains by showing the manufacturing facilities in a map (Everlane, 2023).

Bio-materials are considered to be one of the most prominent ways to increase the sustainability of a garment. These materials are created from renewable biological resources and thus offering a biodegradable option to the mass of oil-based clothing. One of the biggest questions regarding bio-materials is that is it actually scalable to counter the damage done by fast fashion and can it be used as an answer to the fashion industry's waste problem (Fashion for Good 2026). Examples of bio-materials are materials produced by ECONYL regenerated nylon, Tencel lyocell, and Reishi's mycelium-based leather, which has a carbon footprint of only 8% of the value of bovine leather (Ellen MacArthur Foundation 2017; Williams et al. 2022).

Digital fashion markets sell virtual clothes to avatars in social and game-based media or to businesses as an option to cut physical aspects out of product development and sampling. Digital fashion companies often introduce themselves as a more sustainable alternative for physical clothing manufacturers. For example, services like Fabricant brandish virtual fashion as a way to eliminate the bottleneck of physical sampling, making the product development process faster and more sustainable (Fabricant 2026). The founder of Fabricant, Kerry Murphy even says that a company does not waste any resources, only data and imagination (Fab 2021). Even though the model records close-to-zero material consumption, there are concerns related to energy consumption. Every virtual garment is connected to the global network of data centers which in turn use vast amounts of energy (Sustainability Directory, 2025).

2.4.2 Sustainable fashion brands financial performance

The economic situation of sustainable fashion brands is a very important topic of concern since positive results of the performance of such brands could serve as a good source of information about the viability of sustainable business models and their growth potential in the fashion industry. The financial performance of sustainable fashion brands may be affected by several factors, such as the efficiency of their operations, consumer confidence, and the current economic situation. (Wyshelesky 2025) In order to attain operational efficiency, sustainable fashion brands must utilize environmentally friendly materials in their production as well as innovative production design. Common examples of innovative design methods are modularization and platform design. These techniques tend to result in operational efficiency and cost reductions (Niinimäki 2018).

Due to the rise of awareness and knowledge of the environmental and social impacts of fashion, and increased interest for more circular fashion is also on the rise. The brands that respond to this need and proactively communicate sustainability programs have the potential to achieve sales and loyalty growth. This, in turn, improves their financial performance. (Gonçalves & Silva, 2021) The number of investors considering environmental, social, and governance (ESG) issues in the development of their portfolios is constantly growing (Minev

et al. 2025) and this tendency makes sustainable fashion companies even more appealing to this type of capital allocators. Easy supply of capital is a vital condition to these businesses not just to fund incremental expansion of operations but also to direct towards continuous research and development projects as well as to sustain market penetration (Fletcher & Grose, 2012).

Although these are some of the possible benefits, sustainable fashion brands can also be confronted with challenges of their own, which can affect their financial performance. For example, the application of sustainable materials and environmentally friendly technologies can be more expensive, which can result in higher production prices and retail prices. Also, sustainable brands are likely to face challenges regarding communication as it is surprisingly difficult to justify higher prices based on only sustainability. (Hofmann et al. 2022)

The existing research on the financial performance of sustainable fashion brands is insufficient, and further empirical research is required to provide a more comprehensive picture of the relationship between sustainability and financial performance in the fashion industry. However, a study made by Simon et al. (2022) revealed strong evidence that sustainable practices in a fashion firm are positively associated with financial performance. Based on the study, investments in stronger sustainable practices can produce improvements in financial performance.

2.4.3 Issues and Opportunities of sustainable fashion

Even though the sustainable fashion industry has already achieved some success, there are still a number of issues that have to be overcome in order to enhance the sustainability and financial success of sustainable fashion brands (Hofmann et al. 2022). Some of the most important challenges and future trends in the field are outlined in this section.

One of the most important issues relates to transparency and traceability across the supply chain. To ensure the sustainability claims of fashion brands, transparency and traceability of the supply chain are important to ensure so that consumer confidence is developed. However, global fashion supply chains are quite complicated, and reporting practices are not

standardized, which poses a major difficulty in understanding the process from the consumer's point of view (Dobos & Éltetö 2022).

Another key challenge concerns consumer education and behavioral change. Although consumer demand for sustainable fashion is increasing, there is a need to have greater consumer education to encourage sustainable consumption patterns and behavior change. The next steps are to spread awareness about the environmental and social consequences of fashion and make consumers think about their choices when buying products from a clothing brand. Increasing consumer awareness can therefore play a critical role in shifting market demand toward more responsible production and consumption practices. (Niinimäki 2018)

In addition to consumer behavior, broader collaboration within the industry is required to address sustainability challenges effectively. The sustainable fashion industry is dealing with complex problems that cannot be solved by individual companies, and collaboration is the key to industry-wide efforts (Niinimäki et al. 2020). Through coordinated efforts between brands, suppliers, regulators, and civil society, it becomes possible to address systemic sustainability challenges that extend beyond individual organizations.

Investing in pollution-control technology also plays an important role in advancing sustainability within the fashion sector. Technological innovation and research must be carried out to find and adopt new technological methods in sustainable fashion, including new materials, manufacturing, and recycling technologies. Research and development may be necessary to push technological change and contribute to the introduction of more sustainable practices in the industry. These innovations may help reduce resource consumption, improve recycling capabilities, and enable more efficient production processes. (Niinimäki 2018; Niinimäki et al. 2020)

Finally, policy and regulatory interventions can significantly influence the pace of sustainability transformation within the fashion industry. Governments can support sustainability in the fashion industry by setting policies and regulations that promote sustainability in the fashion industry and punish environmentally damaging actions Policy interventions that could be used are for example carbon tax or favorable terms to businesses offering sustainable fashion services. Such regulatory measures can help create incentives for companies to adopt more sustainable practices and improve accountability across the industry. (Mizrachi & Tal 2022)

2.4.4 Measuring the Sustainability Initiatives Impact in Fashion

In order to evaluate the success of sustainability initiatives in the fashion industry and the effect they have on the financial performance of sustainable fashion brands, it is important to design and apply appropriate instruments and indicators. Some of the most important approaches and models for measuring the effects of sustainability initiatives in fashion are discussed in this section.

Life Cycle Assessment (LCA) and carbon footprint analysis are tools that can enable brands to measure the effect of their products and operations on the environment (Gonçalves & Silva 2021). The approaches give a methodical way of quantifying the environmental performance of fashion products and processes, which allows companies to see where they are going wrong and where they can improve with time.

The social impact assessment (s-LCA) of sustainable fashion brands entails the evaluation social and socio-economic aspects such as working conditions, labor rights, and community engagement programs of the companies and suppliers (Gonçalves & Silva 2021). The Workplace Code of Conduct by the Fair Labor Association (2025) and the Base Code by the Ethical Trading Initiative (2025) are the tools that can assist companies in implementing and ensuring ethical labor standards in the supply chain.

Also, frequent sustainability reporting and disclosure efforts have the potential to give stakeholders, such as consumers and investors, the possibility of getting clear information regarding how a firm is doing in terms of sustainability and sustainable efforts (Jambor et al. 2023). There is a reporting framework, such as the Global Reporting Initiative (GRI) or the Sustainability Accounting Standards Board (SASB) standards, that can help companies communicate data on sustainability comprehensively and comparably.

Eco-labels or sustainability third-party certifications, such as Fair Trade or GOTS are also important approaches to increase sustainability and transparency in the fashion sector. These labels act as the independent verification of a company when it claims to be sustainable. The certifications are likely to help consumers to make informed decisions on sustainable

products, and this will benefit the performance of brands prioritizing sustainable goods (Almeida 2014).

The quantification of the influence of sustainability efforts in the fashion industry is critical in defining the success of such measures and the consequences on sustainable fashion's financial performance. Using a mixed set of tools that include environmental impact assessment, social impact assessment, sustainability reporting frameworks, certification, and ESG, businesses can show the world that they care about sustainability and that stakeholders have a clear picture of the way their business performs.

2.5 Anchoring Theories

The theoretical foundation is based on four interconnected theoretical strands, which include Corporate Social Responsibility (CSR), Stakeholder Theory, the Triple Bottom Line (TBL), and the Circular Economy (CE) theory.

CSR literature argues that firms have their duties that are more than profit maximization, it includes environmental stewardship and welfare of the society (Carroll 1991). Stakeholder theory adds refinement to this assertion by explaining how interaction between various constituencies, such as shareholders, employees, suppliers and customers are necessary for organizational purpose (Freeman 1984, 25). Triple bottom-line model operationalizes CSR on the basis that corporate performance appraisal should be measured on three interdependent levels: People, Planet and Profit (Elkington 1999; Miller 2020). Lastly, circular economy literature redefines sustainability as a design issue where the strategy should create restorative material flows and product life-cycle expansion as an alternative to decoupling economic growth and resource loss (Ellen MacArthur Foundation 2017, 22; Kirchherr et al. 2018).

3 Methodology

3.1 Literature search

An information retrieval process, which has been used in this thesis, followed a three-stage process which was meant to ensure a thorough and methodologically effective review. This structure combines series of database search, careful filtering through accessed materials and backward tracking to discover more relevant literature.

The first stage was the systematic searches in LUT Primo, an academic library database of the university, where access to a wide range of scholarly journals, monographs, and reports is provided. Also, to broaden the scope of the search, Google Scholar and Google search was used to find some more publications. Some of the articles initially found through this search were afterwards located in full through LUT Primo. The keywords used to support the search strategy included: ESG, ESG in fashion, ESG frameworks, sustainable business model, and circular fashion to support the aim of the research. Search has been limited to publications in 2010 years and above as this was done to capture current scholarly trends in recent years that are included in the background literature. However, in case a critical theory or framework was developed before 2010, the original source has been properly referenced to maintain academic integrity.

The second part of the process was a methodological review of the sources retrieved in terms of credibility and relevancy. Titles, abstracts, and methodological sections were also examined to rule out articles which were peripheral, old-fashioned and articles without empirical foundation. The preference was given to peer-reviewed journal articles, the long-established ESG frameworks (e.g., GRI, SASB, and TCFD), and official industry reports. The filtering process reduced the original corpus to a size that was manageable with the highest quality contributions that either specifically covered ESG in the fashion industry or provided applicability in other related areas.

The third step constituted of backward tracking citations to ensure that other pertinent sources that had not been reached through the first search string were discovered. A systematic search of the reference lists of the selected articles (with paying special attention

to the descriptions of the introduction and the background literature) was the part of the process that aimed to find seminal works and the most influential studies. Going backward turned out to be particularly useful in discovering groundbreaking theories and prior contributions that have subsequently influenced how ESG models are developed and sustainable fashion processes are conducted. In instances where these theories were composed before the year 2010, the source materials were referenced literally to ensure accuracy and scholarly integrity. This step therefore enhanced the literature base by adding studies that are current and historically relevant.

3.2 Qualitative Research Approaches and Methodologies

This research uses a qualitative approach based on face-to-face and online interviews of professionals representing various occupational backgrounds in the fashion sector. According to Meuser and Nagel (2009), expert interviews can be described as a discussion with individuals who have an advantage of knowledge or power in a certain study field. This methodological choice is especially fitting for research studies on environmental, social and governance (ESG) structures in the fashion industry since the general sustainability knowledge is not adequate to highlight the complex interrelationships and field-specific challenges that the industry presents. This thesis utilizes semi-structured approach where all the participants were asked the same core questions but still allowing the experts to answer them freely without having to stay in a certain framework. This method also allows follow-up probes to be used for deeper insights. Combination of these methods allows for consistency making the findings comparable while still ensuring that all themes that are relevant to the fashion-specific environmental scorecard as well as sustainable business models is examined. (Wilson 2014, 24-41)

Individual interviews help to obtain more meaningful responses, as questions are asked directly to the participants, and questions can be personalized. Expert interviews can therefore provide quick access to practical information, especially where it needs to expand on a certain matter being discussed. (DiCicco-Bloom et al. 2006)

3.3 Research Design and Scorecard Construction

The current study uses a two-phase qualitative study design, which links tool development with its application in practice. Also, quantitative elements, such as relevance ratings, indicator weights allocations and score calculations are used to structure input from scorecard development process into comparable numerical results. Stage A consists of the development of the preliminary list of sustainability indicators into a fashion-specific Environmental Scorecard. Potential metrics derived out of the available literature are presented to experts, who in turn review applicability, data availability, and weighting coefficients. Stage B involves rankings of the nine sustainable-fashion business models based on interviews with the experts. The results can inform which models provide the largest level of environmental benefit when compared with the stakeholder-weighted criteria and define which indicators play the largest role in the ranking changes. The sequential process of indicator screening to the end model ranking is graphically shown in Figure 2 to show the progression of understanding in the process.

3.3.1 Draft set derived from the literature

In the beginning, the literature relating to the environmental performance measurement in the apparel sector was analyzed thoroughly to acquire the initial pool of indicators. Basic principles of modelling ESG were further elaborated through the sector-specific principles provided by: Global Reporting Initiative (GRI), Higg Facility Environmental Module (Higg Index), Materials Matter Standard (Textile Exchange) and SASB/ISSB Apparel Standard. Out of these, the original set of indicators was assembled to represent the entire apparel value chain, encompassing the sourcing of raw-materials to production, distribution, and end-of-life aspects. The frequency and scope of which environmental impact categories appeared across these frameworks was later used to construct a provisional literature-derived weighting model. GRI was excluded from this convergence analysis as it appears in modules that are already divided into sections based on the indicators and would therefore provide no new evidence to the analysis.

Table 1. Sustainable indicator draft set.

Indicator	Example Metrics
Carbon emissions	Scope 1–3 (kg CO_2e per kg textile)
Water usage	m^3 per tonne textile
Chemical management	% MRSL-compliant chemical inputs
Sustainable materials	% certified materials (GOTS, GRS, RWS etc.)
Energy efficiency	kWh per unit textile output
Waste Management	% recycled or recovered
Transportation emissions	kg CO_2e per tonne-km
Packaging sustainability	% recycled or bio-based packaging
Biodiversity impact	Mean Species Abundance
Transparency & traceability	% suppliers mapped (Tier 1-3)

Although literature keeps bringing these themes up, it fails to offer a consistent scheme of weighting. For that reason, two uniform approaches were compared:

- Equal weighting (10 % each) maximizes the neutrality, but it does not consider materiality
- Each indicator's frequency of appearance across the three frameworks above was noted. Relative frequencies were rescaled to 100 %. The resulting vector emphasized Carbon (25 %), Water (20 %), Circularity & waste (20 %), Sustainable materials (20 %) and Chemicals (15 %).

Weighting the indicators with relative frequencies through literature was chosen for the Scorecard v1 as it seems to bring a bit more realistic approach.

3.3.2 Refinement through Expert Interviews

A single-round structured interview was used. Four Finnish practitioners and a trio of sustainability specialists completed two quantitative tasks. First one being relevance rating (1=low, 5=high) for each of the ten indicators derived from literature. Afterwards, experts

allocated weights across five provisional core metrics. The provisional list of indicators was given to every expert before the interview, and he/she was expected to rate all metrics on the relevancy scale. Moreover, interviewees placed a relative degree of importance on every indicator, thus, creating a system of weights based on the judgment of the experts. Indicators that were identified as redundant or overly burdensome to measure were excluded through the dialogue process. This left five main environmental metrics, which happened to be the same indicators that were considered to be most relevant based on the literature. As the average weights didn't sum to equal 100 %, they were normalized using weight normalization to get the final weights of the indicators. The formula used for normalization is shown below:

$$\omega_i^* = \frac{\omega_i}{\sum_{j=1}^{n} \omega_j} \times 100$$

Where:

ω_i^* *is the new nomalized weight*

ω_i *is the original mean weight*

$\sum_{j=1}^{n} \omega_j$ *is the sum of all weights*

To assess the level of agreement among the experts regarding the relative importance of the indicators, Kendall's coefficient of concordance (W) was calculated. Kendall's W is commonly used to measure the degree of consensus among multiple raters when ranking or prioritizing a set of items. The coefficient ranges from 0 (no agreement) to 1 (complete agreement) (Field 2014). In this study, the statistic was used to evaluate whether the experts demonstrated a consistent prioritization of the candidate environmental indicators before the final weighting vector was constructed.

The formula used for Kendall's W is shown below:

$$W = \frac{12S}{m^2(k^3 - k)}$$

Where:

m = number of raters

k = number of subjects

S = Sum of squared deviations

When relying entirely on peer-reviewed literature to identify the indicators and, consequently, use the data collected during the consultation with field experts as the means of refinement and weighting, this approach ensures that the Environmental Scorecard is not only solidly grounded in the theoretical framework but is also feasible regarding its application into the practical activities within the industry.

After validating and testing the indicators with industry experts, the final scorecard was constructed. This scorecard was then used to test the environmental sustainability of different business models that are considered sustainable in the fashion industry. For this test, each archetype was assigned an indicative score between 1 and 5 on each of the core indicators. 1 being weak environmental performance and 5 meaning strong environmental performance. The final score was then calculated using the formula below:

Final score = Σ (indicator score / 5 × indicator weight)

Using this formula the total results can be produced on a 0-100 scale, making the archetypes directly comparable. The results of the evaluation were compared to the ranking of sustainable business models provided by the industry expert interviews.

In this thesis, the steps were demonstrated at the level of business model archetypes that were scored using indicative data found from literature and expert interviews. This was done as no direct indicator-level measurements were available and to have a direct comparison to the expert derived ranking of models.

3.4 Sampling strategy and participant profiles

The sampling strategy used was purposive in order to have a various but specialized background in the fashion industry and sustainability programs. This method also prioritizes

in-depth insights rather than generalization (Patton, 2015). Each of the participants is engaged in the fashion industry and is currently shaping the perception of sustainability in the industry.

The interview was carried out with four individuals, and one sustainability team. The participants in question are introduced below:

Fashion Designer (S1)

A fashion designer, S1 is a reputable figure in the local scene and has been designing clothes for five years and has served multiple clients during his time. S1 sheds light to practicality in terms of life cycle thinking, material choices and daily activities of the operational aspects related to making of truly sustainable garments.

Sustainability Project Assistant (L) - Kekäle

Focusing on circular fashion impact assessment and sustainable collection planning, L can provide hard market data and design-driven knowledge strengthening the ESG framework of the study and aligning the strategic intent with empirical practice.

Professor of Practice (S2) - LUT University

S2 is an economist, years of experience as a fashion editor, and a business director of Fashion Finland. Having a comprehensive historical knowledge about sustainability, coupled with high-tech market-analytic skills allows him to validate the assumptions concerning finance, track the development of the industry and compare the sustainable business models of circularity, rental, resale and others.

Administrative Sales Specialist (R) - H&M

R is an Administrative Sales Specialist in H&M. She performs analytical sales -operations on the broader capacity, producing quantified data about the rate of textile-recycling, waste-minimization of unsold-stock. She can also provide information about consumer adoption of conscious-collections, thus providing the important aspect from retail perspective.

Sustainability Specialists - Kesko

Three sustainability specialists of Kesko’s procurement and responsibility functions were interviewed together. The pool of their expertise provided strategic as well as practical aspects of corporate sustainability in a major retail organization in Finland. One of the

interviewees was the Senior Sustainability Manager who was in charge of sustainability in procurement and implementation of ESG standards in sourcing. The other interviewees worked as a specialist in sustainability, with the focus on the practical responsibility activities, stakeholder reporting, and the daily coordination across the supply chain. They jointly provided a broad-based view that encompassed the reporting of corporate responsibility and management of operational sustainability.

Input from the specialists was especially valuable in clarifying how sustainability frameworks could be implemented in practice and what are the barriers to tracking the environmental sustainability of textiles. Moreover, they provided substantive analyses of reporting models, such as GRI, SASB/ISSB, SBTi, Higg Index, and Textile Exchange, and considered key indicators of the environmental and social position from the perspective of industry specialist. The participants' profiles can be seen in the Table 2 below.

Table 2. Interview participant profiles.

Participant	**Profession**	**Specialization**	**Experience**
S1	Fashion designer	Sustainable fashion, life cycle design, practicality of a garment	5 years as a fashion designer
L	Sustainability Project Assistant	Specializes in circular-fashion impact analysis, Sustainable collection planning	Part of various roles in Kekäle for almost two years
S2	Professor of Practice	Deep historical knowledge of sustainability in fashion with market-analytics expertise	Professor of Practice at LUT University, fashion-focused journalist
R	Administrative Sales	Sales-operations analytics for large-scale fashion retail	Two years at H&M

Kesko Sustainability Experts	Senior Sustainability Manager & Sustainability Specialist	Procurement sustainability, ESG implementation, reporting and supply-chain responsibility	Long-term responsibility roles within Kesko's procurement and sustainability functions

Five expert-cases were decided to be enough because the information power is high when participant expertise is specialized and the study aim is narrow (Malterud et al. 2016).

3.5 Interview Process

All the interviews were conducted as individual interviews, either face-to-face or via remote video call such as Microsoft Teams or Zoom. This was done due to the differing schedules and locations. The possibility of remote call had certain benefits regarding the comfort and privacy of the interviews as they could be done from wherever without having to take consideration for example the need to travel.

Interview invitations were sent via email to each participant. These invitations consisted of a brief introduction to the topic being researched and the purpose of the interview. The email also included details of the estimated duration of the interview and the format of which the interview is being done. To each participant a few suitable interview slots were suggested. It was also noted that the interview could be done via Microsoft Teams or face-to-face.

Some informal discussion was done over email or WhatsApp to make sure that the participants are fit for the research and also willing to share their insights on the matter.

The interview dates and times were arranged as follows:

S1 - 28.5.2025 at 20:06

S2 - 30.5.2025 at 11:00

L - 19.6.2025 at 17:33

R - 22.6.2025 at 23:21

Sustainability Team (Kesko) - 6.8.2025 at 15:00

The interviews followed a semi-structured format. Each interview lasted approximately 30 minutes. To make sure that no important information went unrecorded, the audio from the interviews, except for L and R, was recorded with consent of each individual participant. Participants were also informed about the confidentiality measures, and they had an option to withdraw from the interview or omit from answering at any point.

Before starting each interview, participants were informed about the study's objectives and that the data handling procedures align with European GDPR regulations.

Notes from each interview are found in Appendix 1.

3.5.1 Interview Questions

A structured questionnaire was developed, ensuring consistency across all interviews. Each interviewee was presented with the same core questions as seen in Table 3-5 below:

Table 3. Questions regarding sustainable indicators.

Question 1	"What does sustainability in fashion mean to you?"
Question 2	"How well do you know (1-5, the higher the number the better) the current ESG frameworks such as - GRI - SASB/ISSB - Higg Index - Textile Exchange - Science-Based Targets Initiative (SBTi)
Question 3	"How relevant (1-5, the higher the number the better) do you find each indicator for a fashion brand's sustainability performance?"

	Carbon Emissions Water Usage Chemical Management Sustainable Materials Energy Efficiency Waste Management Packaging Sustainability Biodiversity Impact Transportation Emissions Transparency and traceability
Question 4	"Which indicators (if any) might be difficult to measure or track consistently?"
Question 5	"Give weights (%) to these core-indicators based on the importance regarding environmental sustainability" Carbon Emissions Water Usage Chemical Management Sustainable Materials Circularity & Recycling
Question 6	"Choose the three most important indicators in order from highest to lowest"
Question 7	"From your perspective, what are the biggest barriers to integrating these ESG criteria into everyday operations?"
Question 8	"Could you identify any additional sustainability aspects that are missing from this Scorecard?"

Table 4. Questions regarding sustainable business models.

Question 9	"Which elements of this model seem the most feasible for a typical fashion brand to adopt?"
Question 10	"What potential obstacles do you foresee for implementing this model on a larger scale?"
Question 11	"How do you think consumers, both in Finland and internationally, would respond to this model?"
Question 12	"Is there a sustainable business model/aspect that could be left out as unnecessary"
Question 13	"Arrange the given sustainable business models from most to least sustainable"

Table 5. Questions regarding future outlook.

Question 14	"Are there emerging sustainability trends or innovations that you believe could enhance the current Scorecard or business model concept?"

3.5.2 Flow of the interview

Each interview started with an introduction of the research topic. The interviewees introduced themselves and what their expertise is in the fashion industry. It was stated that the interview will be recorded. The Interviewees were asked to describe what sustainable fashion meant to them and if they are familiar with the current ESG frameworks (Questions 1-2).

After introduction, the process of going through the questions regarding the Environmental Scorecard began. First, each participant was asked to give a quick numeric rating (Question 3) between 1 to 5 on certain indicators' feasibility or relevance, 5 being highly relevant and 1 being not relevant at all. Follow-up question was asked regarding the difficulty of measuring the indicators (Question 4). Next the interviewees were asked to give percentual weights to five core-indicators that were chosen from literature and choose the three most

important indicators regarding environmental sustainability (questions 5 and 6). The last two questions (Question 7 and 8) regarding the Environmental Scorecard delved into the barriers of integrating the sustainable indicators into everyday operations and if there is still indicators that are relevant but were not mentioned in the list. After each question, followed an open-ended discussion to clarify responses.

Next part was going through the questions regarding the sustainability spectrum for business models. Each participant was presented with an existing sustainable business model in fashion industry. The participants were asked to comment how possible it would be for a company to adopt elements from the model, what obstacles might arise in the implementation process and how consumers in Finland or abroad would respond to the model (Questions 9 – 11).

Lastly, participants were asked to give their opinion if some of the currents models could be left out as unnecessary (Question 12). To get insight into how industry experts see each model, they were asked to rate all of the given models from most sustainable to least sustainable (Question 13).

Throughout the interview, follow-up probes, such as “what do you mean by that” or “can you give an example” were asked to get more insightful answer.

3.6 Demonstration process of scorecard application

After the final scorecard was created, it was applied to certain sustainable business models to show the practical applicability of it. Four business model archetypes were selected for this demonstration. From the expert interviews two of the highest-ranked and two of the lowest ranked archetypes were chosen: Biomaterials & Innovative Fibers and Resale & Secondhand, together with On-Demand / Made-to-Order and Rental & Subscription. The motive of this choice is to examine whether the scorecard produces similar results to ranking of the models compared to what experts already perceived as more and less sustainable. The five core indicators and their final expert-derived weights are Chemical Management (22.45%), Circularity & Recycling (21.43%), Water Usage (19.39%), Carbon Emissions (21.43%), and Sustainable Materials (15.31%).

Below in Figure 3 is the process manual for the usage of the scorecard.

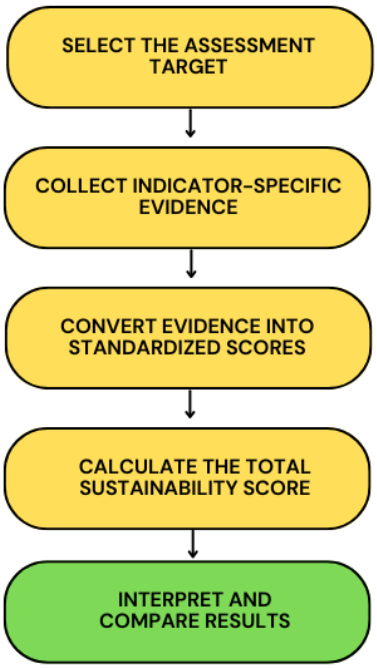

Figure 2. The process flow chart of using the scorecard

The process starts by selecting the evaluation target. The target can be for example a firm that "represents" a certain business model. For example, a clothing rental service company. Next, collect indicator-specific evidence. This means that the user should collect data from the company based on the five core indicators that were Chemical management, Circularity and recycling, Water usage, Carbon emissions and Sustainable materials. Next step is to convert the raw evidence into standardized scores so that each of the indicators receive a score on a common scale. After this, the weighted sum of all five indicator scores is calculated using the scorecard weights. Through this we get the final score for the company/model. The last step is to compare and analyze the results.

The main purpose of this section is to show and explain how the scorecard can be used as a structured assessment tool once the indicator set and weighting vector have been established. As the interview questions regarding business models were mostly focused on feasibility, barriers, consumer response, and overall sustainability ranking, the indicator-level scores below are not directly observed empirical values. More so, they are derived from the combined evidence of the expert interviews and the literature reviewed in this thesis. This is in line with the overall study design, where Stage A develops the scorecard and Stage B applies it to sustainable fashion business models.

For this demonstration, each archetype was assigned an indicative score between 1 and 5 on each of the core indicators. 1 being weak environmental performance and 5 meaning strong environmental performance. The final score was then calculated using the formula below:

$$\text{Final score} = \Sigma \text{ (indicator score / 5} \times \text{indicator weight)}$$

Using this formula the total results can be produced on a 0-100 scale, making the archetypes directly comparable.

4. Results and Discussion

This chapter describes the empirical data obtained through expert interviews. It initially reports the main findings from the expert interviews. This includes presenting the weights that experts allocated to the five core indicators, expert derived sustainability ranking of fashion business models and qualitative appraisal of five focal business models. Finally, this chapter shows what does the final environmental scorecard look like and what results it brings when demonstrated.

4.1 Findings from the interview

The rating of relevance for the ten candidate indicators was done by four Finnish practitioners; a fashion designer, sustainability project assistant, fast fashion sales specialist, and a joint interview group of sustainability specialists. This panel of experts allocated one hundred weighting points to each of the five indicators they considered to be the most material. The raw means can be seen in Table 6 below:

Table 6. Indicator weight averages.

Indicator	**Mean %**
Chemical management	22.0
Circularity & recycling	21.0
Water usage	19.0
Carbon emissions	21.0
Sustainable materials	15.0

These weights were then normalized to make sure that the total equals 100%. The resulting weighting vector used in Scorecard v1.0 was: Chemical Management (22.45%), Circularity and Recycling (21.43%), Water Usage (19.39%), Carbon Emissions (21.43%), and Sustainable Materials (15.31%).

Table 7. Indicator scores.

Indicator	**Mean %**	**SD %**	**Min**	**Max**
Chemical management	22.45	12.7	5	40
Circularity & recycling	21.43	6.5	15	30
Water usage	19.39	2.2	15	20
Carbon emissions	21.43	9.6	10	30
Sustainable materials	15.31	3.5	10	20

Table 7 presents mean, standard deviation, minimum, and maximum values of the expert-assigned indicator weights after normalization. Chemical management, circularity and recycling, and carbon emissions together account for 65.31% of the total weight, indicating that experts considered these indicators to be the most material.

To assess the level of agreement among the experts, Kendall's coefficient of concordance (W) was calculated. The resulting value of $W = 0.32$ suggests a moderate level of agreement in the relative ranking of indicators. Although some variation existed in the exact weight allocations, the experts showed a reasonably consistent ranking of the indicators. Therefore, the mean weighting vector derived from the expert responses was retained as the basis for refining Scorecard v1.0.

During the interviews, experts also noted that deep supply-chain traceability and biodiversity impacts were the most difficult indicators to evaluate due to limited data availability.

The list derived from the expert interviews was chosen over the literature one as the interviews gave more practical insight into the indicators. The indicators that were not used in the core remain in a Tier-2 layer with equal weighting to keep broad coverage while still having the main results understandable.

Table 8. Tier-2 indicators.

Tier-2 Indicator	**Illustrative measure**
Energy efficiency / renewables	kWh per unit, % electricity from renewable sources
Waste diversion	Tonnes diverted from landfill, % recycled content in production
Logistics emissions	kg CO_2e per tonne-kilometre, % low-emission transport modes
Packaging sustainability	% recycled, recyclable or compostable packaging materials
Biodiversity impact	Deforestation-risk hectares, freshwater-quality index near facilities
Transparency & traceability	% suppliers mapped to Tiers 2/3, use of digital product passports

The five areas of impact as decided upon by both the documentary scan and the panel of experts are in agreement on the most material areas considering the fashion sector.

Table 9. Comparison between literature and experts mean weights.

Indicator	**Literature**	**Experts mean weights (Normalized)**
Carbon Emissions	25 %	21.43 %
Water Usage	20 %	19.39 %
Circularity & Recycling	20 %	21.43 %
Sustainable Materials	20 %	15.31 %
Chemical Management	15 %	22.45 %

All of the five indicators that were found from the literature are exactly the ones that practitioners kept after the weighting exercise. None of the Tier- 2 measures; energy,

packaging, transport, biodiversity, traceability makes it on either of the top five lists. Chemical management is found to be the most important indicator based on the experts, reflecting the everyday challenges these practitioners face in terms of limited-substance lists and detox audits. The indication of the panel view is a slight positive change in the value placed on circularity and waste, whereas the indicator of sustainable materials shows a drop of nearly five points. This trend can be interpreted to mean that professionals consider loop-closing measures to be an instant lever compared to just improving material sustainability. Water usage is almost as significant for both lists showing how it is viewed as a widespread significant issue. Even if carbon emissions make up 25% of the framework-based vectors, only 21.43% was attributed to them by practitioners. It is a slight difference which does not mean that climate impact is considered to be insignificant, but it demonstrates all the practical challenges of quantifying the impacts of climate in the fashion value chain. According to experts, Scope 3 emissions constitute more than the vast majority of the sector's footprint, but they are distributed amongst suppliers and geographies, most of the time estimated using a general factor, rather than factual data. On the other hand, problems like chemical management or waste are more practical, more auditable and directly can be done within the current procurement and compliance programs. The lower weight given to carbon emissions, however, does not imply that the role of emissions is being neglected, the weight given to carbon emissions simply notes that reliable and useful carbon metrics are hard to operationalize at a company level.

4.1.1 Expert Perceived Sustainability Ranking

The sustainability ranking of the ten business-model archetypes based on the scores assigned by the experts on a scale from 1 to 10, where lower scores indicate higher sustainability. Mean ranking of all models was then determined and it was sorted out in ascending order as seen in Table 10. below:

Table 10. The average sustainability rank based on expert interviews.

Final Rank	Business Model	Avg. Expert Rank
1	Circular Fashion	2.0
2	Biomaterials & Innovative Fibers	2.4
3	Resale & Secondhand	3.8
4	Upcycling	5.2
5	Repair Service	5.6
6	Take-Back Service	5.8
7	Local & Transparent Production	6.8
8	Virtual & Digital Fashion	7.4
9	On-Demand / Made-to-Order	7.8
10	Rental & Subscription	8.8

Following a discussion with experts, I opted to make the circular fashion archetype a non-ranking parameter, given that it is more like an umbrella framework of the other business model types and does not offer the similarity of constructs to other business models when compared.

4.1.2 Qualitative Appraisals of Five Focal Models

To complement the quantitative results, qualitative assessments were done on five typical archetypes. The main findings related to the aspects of feasibility, implementation challenges, and customer reactions are outlined below.

Repair Service - Fashion Designer S1:

The model was described as readily incorporable into an atelier workflow. Every item might be sent with a repair voucher and a basic “fix-it” kit, and tailors within the company could do more complicated repairs. A major challenge comes in the process of quality control after the pieces have left the studio. According to the interviewee, garments repaired outside the original studio may not always meet the brand’s original quality standards. High repair costs may discourage consumers who are accustomed to fast-fashion price levels.

Finnish consumers are still divided about the implementation of repair services. Markets that more traditionally value durability like Japan and Western Europe may be more receptive to brand repair services. The expert also noted that combining repair services with rental add-ons could dilute the sustainability message rather than strengthen it.

Rental & Subscription - Journalist/Professor S2 (LUT-University):

The expert described rental models as attractive in theory but noted that "no firm has yet made the model work at scale." Small subscriber bases and garment depreciation were identified as factors that significantly reduce profit margins. The main operational challenges include cleaning costs, complex logistics, and the depreciation of inventory over time. The expert also expressed skepticism regarding potential greenwashing when brands use rental services primarily to redistribute unsold inventory. While Finnish consumers show some interest in rental services, price-sensitive customers still tend to prefer product ownership. The expert further suggested that combining rental services with resale options could dilute the clarity of the business model until the rental component itself becomes economically viable.

Resale & Second-Hand - Project Assistant L (Kekäle):

The interviewee noted that resale systems are relatively easy to implement once a company commits sufficient resources. Successful implementation depends largely on effective staff training and clear communication with customers. Key challenges include protecting brand image and ensuring reliable product authentication. In Finland, the adoption of resale models is expected to grow steadily, while more rapid expansion may occur once cultural attitudes toward second-hand consumption shift in markets where resale is currently less established. The interviewee also suggested that introducing rental schemes may distract companies from optimizing resale operations, and therefore companies should focus on improving the efficiency and credibility of their resale systems.

Virtual & Digital Fashion - Sales Specialist R (H&M)

Digital try-on technologies may reduce product returns by allowing consumers to assess fit and appearance before purchase. However, fully virtual garments currently remain a niche market. According to the interviewee, mainstream consumers do not yet place significant value on purely digital ownership, and the energy consumption associated with server

infrastructure and digital platforms remains insufficiently quantified. As a result, the current user base is largely limited to early adopters. Consequently, purely digital wardrobes are more likely to complement durable physical products rather than replace them entirely.

Local & Transparent Production - Sustainability Specialists (Kesko)

Possible in principle, but “a major undertaking.” The first step is to publish supplier’s origins and demand third-party audits. Only then can continuous improvement begin. Complex, multi-tier supply chains make it difficult to secure full transparency. Scaling local production is constrained by infrastructure gaps, higher costs and limited availability of certified components (zippers, trims, coatings). Finnish consumers express interest in origin and transparency, but actual purchasing decisions remain driven by price and brand image. Willingness to pay a premium for verified local production is inconsistent. Over-extending claims under the new green-claims regulation. The experts stressed starting with modest, verifiable disclosures rather than broad promises of “fully local” production.

4.1.3 Cross-Case Observations

Chemical management, circularity & recycling and carbon emissions jointly account for around 65 percent of the experts’ weighting, confirming them as the anchor dimensions of fashion sustainability. Sustainable materials retained a supporting role, valued for long-term fiber transitions but regarded as less decisive than loop-closing and compliance measures.

Traceability beyond Tier 1 and biodiversity impacts were identified as the most elusive data points. Reliable emissions and input data were considered prerequisites for any indicator set, highlighting the practical barriers to measurement that persist across the industry.

The consensus business-model spectrum placed Circular Fashion as the top-ranked archetype, narrowly ahead of Biomaterials & Innovative Fibers, while Resale and Second-Hand secured third place. Local and Transparent Production also ranked highly, reflecting the growing salience of digital product passports and supplier disclosure. At the opposite end, Rental and On-Demand manufacturing were consistently viewed as resource-intensive and difficult to scale.

4.1.4 Practicality and data-gap findings

The interviews revealed three cross-cutting themes, all of which were branded hard to measure by the respondents, a view that also resonates with the UNEP caution on the fragmentation of deep-tier data.

Small brands have a financial constraint in their resources to get systematic water metering and chemical testing. Even large retailers do not have universal audited supplier data to use. The data assurance was found as the new priority.

Sustainability-relevant but non-environmental gaps, such as durability/repairability, consumer education metrics, and the ethics of artisanal sourcing also appeared in the interviews.

4.2 Final Fashion-specific Environmental Scorecard

After refining and validating the candidate metrics through expert interviews, the final fashion specific Environmental Scorecard includes five core indicators that are weighted according to average judgement from the experts. This scorecard reflects the most material environmental dimensions for apparel value chains.

Table 11. The final environmental scorecard.

Indicator	**Definition & Metric**	**Weight (%)**
Chemical Management	% of inputs compliant with Zero-Discharge MRSL. audit pass-rate for substance controls across Tier 1 suppliers	22.45
Circularity & Recycling	% of end-of-life material reclaimed through design for disassembly, take-back logistics or fiber-to-fiber recycling	21.43
Water Usage	Process and facility water intensity (m^3 per tonne product or per annum), adjusted for regional water-stress factors	19.39

Carbon Emissions	Cradle-to-gate greenhouse-gas intensity (kg CO_2e per kg product), net of credible offsetting	21.43
Sustainable Materials	Share (%) of fibers meeting recognized eco-standards (e.g. GOTS, GRS, RWS) or biobased/recycled content	15.31

4.3 Final Sustainability Spectrum

Below is the consensus interview-based sustainability ranking of the nine archetypes, based directly on the experts' 1-10 scores (lower = more sustainable). The mean rank for each model was taken and then sorted ascending:

Table 12. The sustainability spectrum of business models.

Final Rank	Business Model	Avg. Expert Rank
1	Biomaterials & Innovative Fibers	2.4
2	Resale & Secondhand	3.8
3	Upcycling & Remanufacturing	5.2
4	Repair Service	5.6
5	Take-Back & Recycling	5.8
6	Local & Transparent Production	6.8
7	Virtual & Digital Fashion	7.4
8	On-Demand / Made-to-Order	7.8
9	Rental & Subscription	8.8

Circular Fashion was excluded from the final sustainability spectrum because it was interpreted as an umbrella concept rather than a directly comparable business model archetype.

4.4 Demonstration of scorecard application to selected business model archetypes

The results of the demonstration are shown in Table 13. The higher the score is, the more sustainable that archetype is based on the scorecard.

Table 13. Sustainability scores for the archetypes.

Archetype	**Chemical management**	**Circularity & recycling**	**Water usage**	**Carbon emissions**	**Sustainable materials**	**Final score (0-100)**
Biomaterials & Innovative Fibers	4	3	3	4	5	74.9
Resale & Secondhand	4	5	4	4	3	81.2
On-Demand / Made-to-Order	3	4	3	3	3	64.3
Rental & Subscription	3	4	3	3	2	61.2

The scorecard gives the highest score to Resale & Secondhand. This result is consistent with the interview findings where the archetype was rated second in the combined results. Resale was described as relatively feasible to implement once sufficient resources and communication with different stakeholders are in place. The high score is a result of the archetype performing well in circularity (5) as well as high scores in chemical management, water usage and carbon emissions. The basis of these results lies in the fact that Resale & Secondhand extend the life cycle of existing products with each new owner. This also reduces the need for new production.

Biomaterials & Innovative Fibers receives the second highest score. This also is consistent with expert ranking where the archetype was placed at the top of the sustainability spectrum. Based on the literature, biomaterials are seen as one of the most promising approaches for reducing the environmental burden of fashion products. Great examples of such biomaterials are for example lyocell, which is a fiber made out of wood pulp. It works as an alternative for cotton or silk (Sewport, 2026) Another example would be mycelium-based leather, that could be used as a substitute for real leather. The reason why Biomaterials & Innovative fibers are not in the first place is that even if they try to counter all of the environmental sustainability problems out there, the technology at this point is not advanced enough to fully

scale the production to answer the demand of the industry. In an ideal world, there would be fiber that would be easy to recycle, would use water conservatively and would decrease carbon emissions. However, most of the new innovative materials require a lot of effort and resources to be produced. And at this point, the scalability isn't there to match the demand. This is why the circularity & recycling score, together with water usage is kept at a moderate level. Innovative materials alone do not guarantee a closed-loop recovery.

At the bottom end of the ranking is On-Demand / Made-to-Order and Rental Subscription. This doesn't necessarily mean that these models are environmentally weak in absolute terms but more so that they don't automatically secure sustainability across all indicators. The sustainability of these models still relies heavily on things like sourcing methods, material choices, production methods and energy use. Made-to-order, for example, can eliminate cutting waste and risk of over production but if the company still produces everything from polyester using material supplier from the other side of the world, the end result is far from sustainable. This analysis converts to the points seen in the table. The logic of decreasing cutting waste gives the model high score of 4 in Circularity & recycling, but other indicators are dependent of the user of the model.

While rental services do work well by increasing the overall use of one garment and by decreasing the need of buying a new garment, it is difficult model to scale further. Optimally a rental service would have enough pieces of the same garments as there is demand but rarely this is the case and the potential customer would not get the garment of their preference at a certain time. This would lead to a situation where the customer would still have to buy a similar garment in the end. Also, high usage rate of a single garment would lead to the garment to wear faster than normally. Other sustainable obstacles are water usage from constant cleaning of the garments and transportation emissions. The model receives high score from circularity and recycling, which is the only category that inherently works for this model. The other scores are more dependent of the user of the model. That is also the reason why the model receives 2 from Sustainable materials.

After comparing the scores from the demonstration to the expert ranking, the broad direction is the same. The two top archetypes remain at the top, even if the positions change, while two of the lowest ranked archetypes stay at the bottom. One of the main takes from this analysis is that being at the bottom of the ranking doesn't automatically mean that the models are not sustainable but rather that the sustainability performance is more conditional

compared to the top tier models. This demonstration was made to support the practical usefulness of the developed scorecard. Even if the archetype scores are illustrative rather than directly measured, the scorecard shows that it can be used as a tool to assess and compare sustainable fashion business models in a structured way.

4.5 Managerial Implications

After removing the Circular Fashion parameter, Biomaterials and Innovative Fibers together with Resale and Secondhand are consistently at the top of the sustainability spectrum based on the findings. The current results suggest that investment in the regenerative material innovations and second hand business models will give high environmental returns when measured using the stakeholder-weighted metrics. There are two strategic avenues that are critical. First, companies should improve their collection and take-back infrastructure to retrieve the end-of-life garments and feedstock of the next-generation materials. Without large-scale recycling capacity, the targets on recycled content might not come into existence as a more than a hopeful wish. Second, the companies are supposed to accelerate the use of regenerative and certified feedstocks which include biobased or recycled fibres that reduce carbon footprint and chemical footprint at the same time while enhancing brand reputation among consumers and investors.

The results also highlight the facilitating effect of traceability. Systematic supplier mapping and the implementation of digital product passports are among the most essential requirements to be able to substantiate circularity claims as mentioned by Kesko's sustainability team. Companies that introduce tier-2 and tier-3 transparency into sourcing are additionally more likely to comply with the new EU regulations and reduce the reputational risks caused by unsupported green claims.

Though not as powerful as fully circular strategies, such strategies as upcycling, resale, and repair services could be considered a promising way to move to the next level. Compared to large changes in material systems, these models can be operationalised much faster. Pilot projects to repair kits, on-demand mending or collaborating with local ateliers may add value to brand and enhance storytelling around longevity and authenticity. The same way, resale platforms guided by curators offering bypassed authentication protocols would offer a

chance to recieve value of second-hand products while succeeding with companies' circularity goals.

At the other end of the spectrum, the analysis recommends to be wary of resource-intensive models such as rental subscriptions and virtual fashion. Both models have high operational expenses and unaddressed environmental issues. In the case of rental subscriptions, it consists of logistic and cleaning demands, whereas virtual fashion according to experts is associated with the heavy consumption of server-energy that requires significant amounts of water for cooling. Based on this, companies must undertake serious lifecycle-cost evaluations before engaging in large scale roll-outs. Companies also must focus on the low-energy options of digital try-on systems as opposed to fully virtual wardrobes.

Finally in all business models the interviewees revealed long-term gaps of data in terms of biodiversity and deep-tier traceability. Having credible ESG claims will require the integration of responsive data assurance measures, such as supplier audits, digital passports and biodiversity indicators. The Environmental Scorecard in itself should also be re-evaluated on a periodical basis. The weightings used today are based on the panel that is Finland-centric, so a re-weighting once per two years with the participation of a wider range of global stakeholders would be better in terms of credibility and applicability to a wider range of the world. Also, the sustainable innovations emerge fast. So in a few years the information that the practitioners have might already be outdated which may affect their opinions on certain indicators.

4.6 Theoretical Implications

This study makes several contributions to sustainability scholarship. By bringing practitioners views into quantifiable weights, this scorecard creates a scalable middle-ground between unweighted expert opinions and resource-intensive Life Cycle Assessment tools. The scorecard allows stakeholders to calculate an environmental score in different points of their value-chain. It also gives a comparative tool to other ESG tools in the market. As the scorecard is validated by experts, it gives a more realistic and practical assessment of sustainable data and how material each indicator actually is in the fashion industry.

Second, the study shows a slightly different method for developing ESG models. By combining systematic background literature with expert interviews and validation, the tool created is both credible and reproducible. Also, as most of the frameworks already utilized are covering the whole ESG-field, having a tool specifically for environmental side of things is beneficial for the industry.

The study also explains well how the importance of each indicator may differ depending on aspects like size or geographical location of the company. Some stakeholders value different aspects than others.

Regarding the sustainable business model spectrum, the findings highlight that some business models are harder to judge based on their environmental appearance. While the highest- and lowest-ranked models remain in their respective positions on the ranking list, mid-tier models such as repair or upcycling do have much more variability. However, the clear consensus regarding the top models is important. It gives valuable insight for stakeholders what type of models to implement or support for environmental value.

Finally, the study contributes to the lack of standardized environmental scorecard in the fashion industry. Taking into consideration the opinions of different practitioners in the industry gives perspective to the metric design from the actual target audience of the scorecard. Also, documenting the origin of each indicator does give a certain level of transparency to the tool.

5.Limitations and Future Research

5.1. Limitations

This study depends on insights from five expert interviews who all practice their craft primarily in Finland. Even if the information power is strong, its geographic and cultural concentration inevitably narrows generalizability. Fashion supply chains extend deep into manufacturing hubs in Asia and consumer expectations differ in different regions. The present sample also leans toward design, academia and corporate sustainability functions. Suppliers, labour advocates and policy makers were not represented.

As the values and formulas were implemented manually the calculations are prone to transcription errors, which some more dedicated software could flag automatically. Additionally, the weighting protocol relied on a single interview round. Alternative techniques such as a multi-round Delphi or a best-worst scaling survey could produce finer-grained consensus statistics and permit formal stability testing.

There are also limitations related to the way the scorecard was applied to business model archetypes. The demonstration of the scorecard relied on indicative fixed scores rather than real measured values. In real cases the environmental performance of companies around certain business models may vary significantly based on the implementation choices of that company. Logistics, sourcing of materials and technology being used makes a big difference between companies.

5.2. Future Research

Future applications of the Scorecard should therefore widen the research and the panel to include stakeholders from production countries and diverse functional roles to guard against home-market bias and to create a more comprehensive scorecard.

Multiple improvements would create a stronger scorecard and sustainability spectrum derived from it. Weighting the indicators by using also international panelists would reveal more insight from different geographical areas as well as show how big of a role cultural

matters play in the results. Additionally, it would be beneficial for the model if it was implemented to score a larger number of apparel firms and then comparing the results to third-party ESG ratings. It would offer a great validity check and help to calibrate the indicators in the scorecard. Long-term tracking for multiple years would also show how the business-model rankings evolve as technology improves in the apparel industry and also as the regulations tighten, at least in the European Union. One the most significant future research direction would be including social and governance aspects to the model. It would complete the basic ESG perspective and support more holistic decision making in the fashion value chain.

In future research it would be beneficial to improve the analytical robustness of the tool by using fuzzy numbers for example. This would allow each indicator to reflect uncertainty and variation instead of a single fixed value. This method would also be useful with cases where direct empirical measurements are unavailable.

Another way to improve the study would be to apply the model directly for individual apparel companies instead of relying on archetypes. This would make the tool more appealing and useful for different stakeholders as they could evaluate the environmental performance of a single company. This way the rankings of the model could also be more comparable with other third-party ESG-rankings and sustainability benchmarks. Applying sensitivity analysis could also be useful to test how strongly the final ranking depends on the selected indicator weights. Also, it would allow us to see if the resulting sustainability profiles stay the same if different weights were being used.

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Appendix 1. Interview Notes.

Administrative Sales Specialist – R (H&M)

- Sustainability as “less is more, cut consumption, cut waste.”
- Perspective from fast-fashion sales operations.
- Familiarity with formal ESG frameworks is minimal, all rated 1/5.
- Highest relevance scores for energy efficiency 4/5, carbon emissions 3/5 and sustainable materials 3/5.
- Water, chemicals and biodiversity receive less attention in routine store metrics.
- Indicator weighting: chemical management 40%, water usage 20%, carbon emissions 15%, circularity & recycling 15%, sustainable materials 10%.
- Hardest areas to track: chemical handling, waste flows, biodiversity impacts and supply-chain transparency.
- Main barrier is cost efficiency.
- Large-scale sustainability change “isn’t profitable yet.”
- Customers still expect ultra-low prices.
- Suggests adding human-rights impact to the scorecard.
- Sees digital try-on technology as useful for reducing returns.
- Sceptical of purely virtual garments due to resource-intensive IT infrastructure.
- Ranks slow fashion, biomaterials and upcycling as the most sustainable models.
- Places virtual & digital fashion last

Fashion Designer – S1

- Sustainability viewed through durability, craft and brand values.
- Familiarity with ESG frameworks is practical rather than academic: GRI 3/5, Higg 3/5, Textile Exchange 2/5, SASB/ISSB 2/5 and SBTi 2/5.
- Indicator weighting: circularity & recycling 30%, chemical management 25%, sustainable materials 20%, water usage 15% and carbon emissions 10%.
- Circularity is seen as the designer’s most direct climate lever.
- Hardest areas to measure: full-chain carbon impacts, water use, energy use and biodiversity impacts.
- Measurement is especially difficult for small studios using intermediaries.

- Main barriers: cost, limited access to certified recycled fibres and lack of local end-of-life infrastructure.
- Suggested solutions: modular pattern-cutting, repair services bundled with every garment and zero-waste design.

Sustainability Project Assistant – L (Kekäle)

- Sustainability as business models that reduce environmental load while supporting social responsibility.
- Perspective from responsible assortment and retail.
- Familiarity with ESG frameworks: Higg 4/5, SBTi 4/5, Textile Exchange 3/5, GRI 0/5 and SASB/ISSB 0/5.
- Indicator weighting: circularity & recycling 25%, carbon emissions 20%, water usage 20%, chemical management 20% and sustainable materials 15%.
- Top priorities: circularity, biodiversity and waste reduction.
- Main measurement challenges: long multi-tier supply chains, non-standardised water data, non-standardised chemical data and Scope 3 emissions.
- Main barriers: time, rapidly evolving EU regulations and fear of miscommunicating sustainability efforts.
- Sees resale and second-hand as easy if the company commits resources.
- Main hurdles for resale: quality control and brand image.
- Finnish consumers are already receptive to reuse.

Fashion Journalist & Professor of Practice – S2 (LUT-University)

- Sustainability as “a test of influence and integrity across the entire value chain.”
- Perspective from media, economics and academia.
- Familiarity with formal ESG frameworks is modest, all rated 0/5.
- Focuses on the gap between metrics and media narratives.
- Indicator weighting: carbon emissions 30%, water usage 20%, circularity & recycling 20%, sustainable materials 15% and chemical management 5%.
- All indicators are difficult to measure in practice.
- Full Scope 3 carbon and biodiversity impacts are especially difficult.
- Main barrier is economics.
- Brands act sustainably only if consumers are willing to pay for it.

- Sceptical of clothing-rental schemes.
- Rental seen as economically unviable and greenwash-prone.
- Optimistic about material innovations that combine recyclability and margin resilience.
- Transparent storytelling is needed to connect price with genuine impact.

Sustainability specialists – (Kesko)

- Sustainability manager and specialist focus on practical sourcing and procurement, while group-level work focuses on reporting.
- Sustainability in fashion includes environmental and social responsibility, circularity, product longevity and transparency.
- Environmental impacts cover materials, water, energy, land use, chemicals and end-of-life; social aspects include ethical production, safe working conditions and fair wages.
- Supply chains are long and complex, involving many components and subcontractors.
- Familiarity with ESG frameworks: GRI 4/5, SASB/ISSB 4/5, SBTi 4/5, Textile Exchange 3/5, Higg Index 0/5.
- Most relevant indicators: traceability 5/5, chemical management 5/5, waste management 5/5, carbon emissions 4/5, sustainable materials 4/5, energy efficiency 4/5; water use also highly important.
- Indicator weights: carbon 30%, water 20%, chemicals 20%, materials 15%, circularity 15%.
- Key priorities are traceability, carbon emissions and water usage; traceability enables other measurements.
- Main challenges are complex, multi-tier supply chains, limited data and difficulty measuring Scope 3 impacts.
- Barriers include subcontractor complexity, lack of standards, hidden impacts, costs and consumer price sensitivity.
- Transparency can be improved through origin data, supplier disclosure and audits, but must be evidence-based.
- Product design should support durability, repairability and recyclability.
- Textile recycling is still limited; reuse and second-hand are currently more viable.

- Consumers value transparency, but price and availability still dominate decisions; younger consumers favour second-hand.
- Digital solutions are useful when replacing physical processes; purely virtual fashion is less relevant.
- Most feasible models: resale, circular fashion, slow fashion, local production and biomaterials.
- Less scalable: rental, on-demand and upcycling.
- Future trends include digital product passports, data-driven supply chains, repair services and resale platforms.
- Sustainability can be overshadowed by trends, and high price does not guarantee sustainability.

Appendix 2. Expert weights

Indicator	**R (Sales)**	**S1 (Designer)**	**L (Retail)**	**S2 (Professor)**	**Kesko (Sustainability specialists)**
Carbon emissions	15	10	20	30	30
Sustainable materials	10	20	15	15	15
Circularity & recycling	15	30	25	20	15
Water usage	20	15	20	20	20
Chemical management	40	25	20	5	20