



Deadstock in the fashion industry:

Is the on-demand business model a viable and sustainable solution?

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Abstract

The fashion industry is a significant contributor to environmental degradation and waste, with the fast fashion business model exacerbating these issues. Deadstock, or unsold inventory, is a major challenge faced by the industry, leading to financial loss and negative environmental impacts. This thesis investigates whether the on-demand or made-to-order business model can serve as a viable and sustainable solution to the problem of deadstock in the fashion industry. Through an extensive literature review and qualitative research, including case studies and an expert interview, this study evaluates the effectiveness and sustainability of the on-demand model in addressing deadstock. Findings suggest that the on-demand model reduces waste and excess stock while optimizing resources and fostering sustainable practices. However, challenges such as extended lead times, fabric management, and returns management persist. A hybrid approach combining on-demand and traditional manufacturing methods is proposed as an alternative solution. As technology and implementation continue to evolve, the market may become more prepared to embrace the on-demand model, revolutionizing the fashion industry by aligning production with demand, reducing waste, fostering sustainability, and promoting customization and a customer-centric pull model.

Title: Deadstock in the fashion industry: Is the on-demand business model a viable and sustainable solution?

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Keywords: fashion industry, deadstock, on-demand business model, made-to-order, sustainability, environmental impact, waste reduction, supply chain management, customer-centric, fast fashion.

Resumo

A indústria da moda contribui significativamente para a degradação ambiental e o desperdício, com o modelo de negócio *fast fashion* exacerbando esses problemas. O *deadstock*, ou inventário não vendido, é um grande desafio enfrentado pela indústria, levando a perdas financeiras e impactos ambientais negativos. Esta tese investiga se o modelo de negócio *on-demand* ou *made-to-order* pode servir como uma solução viável e sustentável para o problema do *deadstock* na indústria da moda. Através de uma extensa revisão da literatura e pesquisa qualitativa, incluindo estudos de caso e uma entrevista com especialistas, este estudo avalia a eficácia e sustentabilidade do modelo *on-demand* na abordagem do *deadstock*. Os resultados sugerem que o modelo *on-demand* reduz o desperdício e o excesso de stock, enquanto otimiza recursos e promove práticas sustentáveis. No entanto, desafios como prazos de entrega prolongados, gestão de tecidos e de devoluções persistem. Uma abordagem híbrida que combina métodos de produção *on-demand* e tradicionais é proposta como uma solução alternativa. À medida que a tecnologia e a sua implementação continuam a evoluir, o mercado pode tornar-se mais preparado para adotar o modelo *on-demand*, revolucionando a indústria da moda, alinhando a produção com a procura, reduzindo o desperdício, promovendo a sustentabilidade e estimulando a personalização e um modelo de negócio centrado no cliente.

Título: *Deadstock* na indústria da moda: Será o modelo de negócio *on-demand* uma solução viável e sustentável?

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Palavras-chave: indústria da moda, *deadstock*, modelo de negócio *on-demand*, *made-to-order*, sustentabilidade, impacto ambiental, redução de desperdício, gestão da cadeia de suprimentos, centrado no cliente, *fast fashion*.

Résumé

L'industrie de la mode est un contributeur significatif à la dégradation de l'environnement et aux déchets, le modèle commercial de la fast fashion exacerbant ces problèmes. Les *deadstocks*, ou stocks invendus, représentent un défi majeur pour l'industrie, entraînant des pertes financières et des impacts environnementaux négatifs. Cette thèse examine si le modèle commercial *on-demand* ou *made-to-order* peut servir de solution viable et durable au problème des *deadstocks* dans l'industrie de la mode. Grâce à une revue de littérature approfondie et à des recherches qualitatives, comprenant des études de cas et une entrevue avec un expert, cette étude évalue l'efficacité et la durabilité du modèle *on-demand* dans la résolution des *deadstocks*. Les résultats suggèrent que le modèle *on-demand* réduit les déchets et les stocks excédentaires tout en optimisant les ressources et en favorisant des pratiques durables. Cependant, des défis tels que les délais de livraison prolongés, la gestion des tissus et la gestion des retours persistent. Une approche hybride combinant les méthodes de fabrication *on-demand* et traditionnelles est proposée comme solution alternative. À mesure que la technologie et la mise en œuvre continuent d'évoluer, le marché pourrait être plus prêt à adopter le modèle *on-demand*, révolutionnant l'industrie de la mode en alignant la production sur la demande, en réduisant les déchets, en favorisant la durabilité et en promouvant la personnalisation et un modèle de demande centré sur le client.

Titre: *Deadstock* dans l'industrie de la mode : Le modèle d'entreprise *on-demand* est-il une solution viable et durable?

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Mots clés: industrie de la mode, stocks morts, modèle commercial à la demande, sur mesure, durabilité, impact environnemental, réduction des déchets, gestion de la chaîne d'approvisionnement, centré sur le client, fast fashion.

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List of abbreviations

MTO - Made-to-Order

SCM - Supply Chain Management

LSCM - Lean Supply Chain Management

CE - Circular Economy

SBM - Sustainable Business Model

CBM - Circular Business Model

Table of contents

1. Introduction	9
2. Literature review	10
2.1. Supply Chain Management and Deadstock	10
2.1.1. Supply Chain Management Definition	10
2.1.2. Waste Generation and Management in Supply Chains	11
2.1.3. Lean Supply Chain Management	12
2.1.4. Definition of Deadstock	13
2.1.5. Factors Contributing to Deadstock	13
2.1.6. Negative Impacts of Deadstock	14
2.2. Problematization of Deadstock in the Fashion Industry	14
2.2.1. The Environmental Impact of the Fashion Industry	15
2.2.2. Definition of Deadstock in the Fashion Industry	15
2.2.3. Factors Contributing to Deadstock in the Fashion Industry	15
2.2.4. Impact of Holding Deadstock	17
2.2.5. Deadstock Disposal: Options and Motivations	17
2.2.6. Impact of Deadstock Disposal	19
2.3. Sustainable Business Models in the Fashion Industry	19
2.3.1. Definition of Business Model	20
2.3.2. Sustainable Business Models	20
2.3.3. Circular Business Models	21
2.4. On-demand and Made-to-Order Business Models and Deadstock	22
2.4.1. On-Demand and Made-To-Order Business Models Definition and Emergence	22
2.4.2. On-Demand and Made-to-Order as a Solution to Deadstock	23
2.4.3. Advantages and Disadvantages of On-Demand and Made-To-Order	24
3. Purpose and Research Question	25
4. Research Methodology	25
4.1. Research Design	25
4.2. Data Collection	26
4.3. Data Analysis	28
5. Empirical Setting	30
5.1. Lectra	30
5.2. Benjamin Fox	30
5.3. Alohas	31

6. Empirical Findings	31
6.1. Case Study Analysis	32
6.1.1. Business Model and Practices	32
6.1.2. Drivers for Producing On-Demand and Made-to-Order	33
6.1.3. Viability of Producing On-Demand and Made-to-Order	33
6.1.3.1. Advantages	33
6.1.3.2. Disadvantages	35
6.1.3.3. Costs and Pricing	37
6.1.4. Sustainability	38
6.1.5. Elimination of Deadstock with On-Demand	39
6.2. Expert interview	40
6.2.1. Fashion Industry's Shift Towards Demand-Based Production	40
6.2.2. Technology and On-Demand Production in the Fashion Industry	40
6.2.3. Challenges of On-Demand Fashion Production	41
6.2.4. On-Demand & Never-Out-Of-Stock Fashion Production	42
7. Discussion	42
7.1. On-demand or Made-to-Order Business Model: Solving Deadstock Problem and Advantages	42
7.2. Challenges of On-Demand and or Made-to-Order Production Lead Times	43
7.3. Technology Challenges in On-Demand and Made-to-Order Fashion Production	45
7.4. Hybrid Approach: Combining On-Demand and Traditional Manufacturing	46
7.5. Linking Research Findings with Existing Literature	47
8. Conclusion	48
8.1. Findings and Conclusion	48
8.2. Limitations	49
8.3. Future Research	49

List of Figures

Figure 1. Stylized Supply Chain and Waste Generation	12
Figure 2. Roadmap of the research process	26

List of Tables

Table 1. Semi-structured interviews	28
Table 2. Thematic analysis framework	28
Table 3. Coding framework showing identified themes and related codes	29

1. Introduction

The fashion industry is a major contributor to environmental degradation and waste, generating substantial amounts of pollution and consuming significant resources. The fast fashion business model, characterized by rapid turnover of clothing collections, has further amplified these negative impacts. One significant challenge faced by the fashion industry is the issue of deadstock, which refers to unsold inventory that is left unused and often ends up in landfills. Deadstock represents a financial loss for businesses and has negative environmental impacts, contributing to waste and pollution.

The on-demand or made-to-order business model has emerged as a new approach to supply chain management in the fashion industry. Unlike traditional supply chain models that rely on forecasting to produce goods in bulk, the on-demand or made-to-order model enables the production of goods only when customers place orders. This means that brands can avoid overproduction, excess inventory, and waste. The brands that offer fashion-on-demand or made-to-order services have the ability to cater to the customers' expectations in a more direct manner, while also being able to test the market without the need for production. Such brands may even provide personalized and customized products, thus facilitating the creation of a more customer-centric and sustainable fashion industry.

Despite the potential of the on-demand or made-to-order business model as a solution to the issue of deadstock in the fashion industry, there is still limited literature on the topic. In particular, there is a lack of clear definitions and a comprehensive understanding of the various interpretations and applications of the on-demand concept. Additionally, while there is research on deadstock in the fashion industry and its negative environmental and economic impacts, there is little literature exploring the connection between the issue and the on-demand business model. These gaps in knowledge suggest the need for further exploration and analysis of the potential of the on-demand model as a sustainable solution to the problem of deadstock in the fashion industry.

The research question posed in this dissertation is: *“Is the on-demand or made-to-order business model a viable and sustainable solution to the problem of deadstock in the fashion industry?”*. This inquiry seeks to determine the effectiveness of the on-demand model in combating deadstock, as well as any potential drawbacks that may impact its viability and sustainability.

To answer the research question, an extensive literature review was first conducted, covering several topics that provide a theoretical foundation for understanding the deadstock problem in the fashion industry and the potential of the on-demand or made-to-order business model as a solution. Supply chain and waste management are explored to explain how deadstock arises in the industry, while sustainable business model definitions are presented to establish a theoretical foundation for the proposed solution. The review additionally evaluates the advantages and disadvantages of the business model as a potential solution to the deadstock problem in the fashion industry. Regarding empirical data collection, qualitative research was conducted in the form of two case study analyses and one interview with a fashion industry expert.

Overall, this dissertation aims to contribute to the understanding of the potential of the on-demand or made-to-order business model as a sustainable solution to the issue of deadstock in the fashion industry. By evaluating its efficacy and sustainability, this research seeks to provide insights into how the fashion industry can move towards more sustainable practices and reduce its impact on the environment.

2. Literature review

2.1. Supply Chain Management and Deadstock

To ensure the smooth operation of sustainable and efficient supply chains, effective supply chain management (SCM) plays a pivotal role. The upcoming section will discuss the fundamental concept of SCM and how it interconnects with waste generation and management, covering the concept of lean supply chain management (LSCM). Additionally, the section will also address the predicament of deadstock in supply chains, which poses a significant challenge.

2.1.1. Supply Chain Management Definition

Lambert et al., 1998 defined SCM as the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders. They further stated that SCM encompasses all activities associated with the flow and transformation of goods from raw materials through to the end user, as well as the associated information flows. The authors emphasized that the goal of SCM is to coordinate and manage all these activities in a way that improves overall performance and achieves a sustainable competitive advantage.

This definition highlights the importance of integrating key business processes and information flows in SCM, as well as the goal of improving overall performance and competitiveness.

2.1.2. Waste Generation and Management in Supply Chains

As mentioned, the definition of SCM underscores the significance of integrating crucial business processes and information flows to enhance overall performance and competitiveness. An obstacle in reaching these objectives is waste generation, which is a prevalent issue in supply chains and can take many different forms, including the waste of materials, energy, time, and resources. Among these forms of waste, solid waste is a significant issue, as production processes often result in excess production, over-packaging, and spoilage, leading to waste that contributes to landfills and pollution. In fact, poorly managed solid waste contaminates oceans, blocks drains, helps transmit disease, exacerbates respiratory problems, harms animals, and hampers economic development by diminishing tourism (Kaza et al., 2018).

Waste management is of utmost importance in decreasing material waste and enhancing the overall efficiency of the supply chain. This goal can be accomplished through the implementation of various tactics and procedures at the various stages of the supply chain, which encompass raw material generation, manufacturing/production, logistics/distribution, and market/consumers (Mahajan & Vakharia, 2016). These tactics may take the form of a “3R’s” perspective, either proactively reducing resource utilization through product and process enhancements or reactively reusing and recycling materials by ensuring that each input in the supply chain is collected and processed through the reverse supply chain for reintegration into the appropriate stages of the supply chain (Mahajan & Vakharia, 2016).

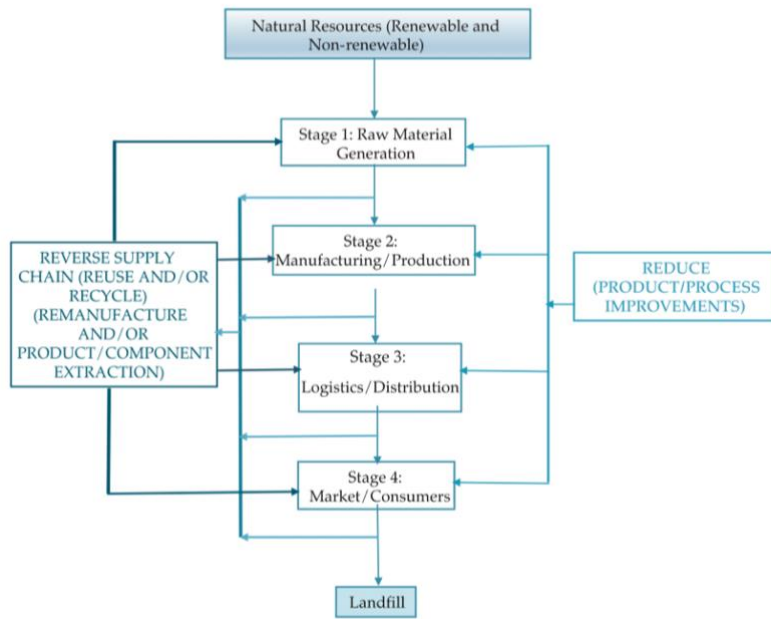


Figure 1. Stylized Supply Chain and Waste Generation Retrieved from Mahajan & Vakharia, 2016

Effective waste management in the supply chain is critical to reducing material waste and improving the efficiency and sustainability of the supply chain. By reducing waste, supply chain managers can lower costs, improve profitability, and reduce the environmental impact of the supply chain.

2.1.3. Lean Supply Chain Management

A management approach that aims to optimize the entire supply chain and consequently address waste reduction is lean supply chain management.

According to Tortorella et al., 2017, LSCM is an approach to SCM that emphasizes the efficient flow of goods, services, and information with minimal waste and maximum value to the customer. It involves reducing waste and optimizing processes throughout the supply chain, from procurement to delivery, to improve quality, reduce costs, and increase customer satisfaction. The goal is to streamline operations and eliminate activities that do not add value to the customer, such as excess inventory, unnecessary transportation, and overproduction. In this integrated LSCM vision, the entire flow from raw materials to the final consumer is regarded as an integrated whole, in which companies work collaboratively to pull what is needed to meet individual customer needs. This entails a different business model, in which improved profits arise from cooperation rather than imposing power over supply chain partners. By adopting LSCM, companies can improve their competitiveness, enhance their sustainability, and create a more agile and responsive supply chain.

2.1.4. Definition of Deadstock

A form of waste that can be found within the supply chain is known as "*deadstock*", which refers to inventory that has been in storage for an extended period, has expired, and presents no selling potential. Firms within the industry characterize stock as dead based on a specific time frame in which it has not been sold, contingent on the type of product, market, and its placement within the supply chain (Sugumaran & Sukumaran, 2019; Wild, 2018).

The issue of deadstock occurs at all levels of the supply chain, from manufacturers to distributors, wholesalers, and retailers. Nevertheless, its consequences are more pronounced at the retail level, mainly because of the high quantity and variety of products that retailers deal with. The difficulty of the management of inventory in retail chain stores further exacerbates the problem (Li et al., 2022).

Jansson and Sjöbohm (2022) explain that deadstock is not limited to merchandise that has remained in storage for an extended period and has become obsolete. Rather, the term encompasses several types of inventories that present little to no selling potential. This includes surplus inventory resulting from overproduction or overordering, returned merchandise, and damaged goods. Moreover, outdated products that are no longer in demand due to seasonal or technological changes also fall under the category of deadstock.

2.1.5. Factors Contributing to Deadstock

According to Li et al. (2022), the causes of deadstock are generally comparable across various industries and companies. The study highlights that deadstock in supply chains has complex and diverse origins and achieving an optimal balance between supply and demand is a major challenge. This challenge is especially difficult due to the complex market environment at the retail level. This market environment is characterized by the presence of multiple customers with diverse needs and a large number of competing brands. The volatility and unpredictability of this setting make it difficult to generate accurate demand forecasts, leading to the accumulation of deadstock.

Li et al. (2022) further assert that mistakes in forecasting contribute to overproduction or bulk purchases, which results in the accumulation of excess inventory. Other reasons include inefficient SCM, which may stem from communication gaps, IT system limitations, and data errors and mismatches. Rapid changes in consumer preferences are also identified as a cause of

deadstock. Furthermore, the occurrence of deadstock may be further intensified by intrinsic product characteristics, such as limited shelf life or seasonality (Hakim et al., 2018). Additionally, unforeseen events like the Covid-19 pandemic can cause misalignments and supply chain problems, leading to even more excess inventory.

2.1.6. Negative Impacts of Deadstock

Deadstock has significant negative impacts on companies, the environment, and society. From a corporate perspective, the production of excess inventory incurs additional expenses due to the unrecovered manufacturing costs and the costs associated with storing, transporting, and managing the surplus inventory. These expenses do not provide any value to the company and are regarded as financial losses, as documented by Luh et al. (2003). This also results in a squandering of resources such as raw materials, energy, and labor, which were utilized in producing the excess inventory. Furthermore, the occupancy of storage space with excessive stock limits the ability of companies to respond promptly to sudden shifts in consumer demand, thereby adversely impacting their competitiveness in the market.

The environmental impacts of deadstock are not limited to the waste of production resources but also include the inadequate disposal of excess inventory. Many products that cannot be recycled or biodegraded are incinerated or end up in landfills, resulting in further environmental damage (Napier & Sanguineti, 2018). For example, poor control of the introduction of pesticides has led to the accumulation of an obsolete stock of the substance in the EAR countries (Ethiopia, Tanzania, Kenya, Uganda, Malawi, and Rwanda), resulting in serious health, ecological, and economic problems. Improper management of pesticide stocks has caused the deaths of farmers in Ethiopia and Ghana due to pesticide misuse, highlighting the severe health risks associated with these practices (Williams et al., 2008).

2.2. Problematization of Deadstock in the Fashion Industry

The fashion industry has gained notoriety for its excessive waste creation, including waste in the form of deadstock. The problem has escalated in importance in recent years, with increasing production rates and concerns about ethical consumption and environmental sustainability. This section will delve into the environmental impact of the fashion industry and the problem of deadstock, including its causes, impacts, and possible options for its disposal.

2.2.1. The Environmental Impact of the Fashion Industry

The fashion industry has a significant influence on society, and most people are impacted by it. Over 300 million people worldwide are employed by the 1,3 trillion USD fashion business across the value chain (Ellen MacArthur Foundation, 2017), and the third-largest manufacturing sector is the apparel sector (Fashion Revolution, 2018). The fast fashion movement emerged within the fashion business during the past 20 years, characterizing the sector with quick turnover times for clothing, more collections created annually, and low costs (Ellen MacArthur Foundation, 2017; Stahel, 2016). This segment of the fashion industry is characterized by linear and fragmented supply chains, which have a negative impact on the environment due to the use of synthetic materials, greenhouse gas (GHG) emissions, and endangering the quality of ecosystems due to heavy water footprints, intensive chemical use, and plastic pollution from waste generation (Cybis & Bernard, 2021). Furthermore, the industry carries social impacts revolving around the working conditions of the ones employed on the scattered supply chain, and various forms of forced labor can be found across the different stages of production (Cybis & Bernard, 2021).

2.2.2. Definition of Deadstock in the Fashion Industry

The last two decades have been characterized by an overabundance of products that have outpaced market demand (Ellen MacArthur Foundation, 2017; Farahani et al., 2022), leading to significant amounts of deadstock or unsold items in the fashion industry.

In the realm of inventory management and the fashion industry, "*deadstock*" refers to merchandise that has not been sold through traditional avenues of distribution within the preceding three-year period or has been officially written off by the company. This category comprises surplus inventory, returned items, and goods that have been damaged. It is important to note that garments that are less than three years old and have not been written off, garments that are sold through regular channels of distribution, and products that have reached the end of their useful lives but remain usable are excluded from this definition (Jansson & Sjöbohm, 2022). In the context of this research, this term will be used as previously defined.

2.2.3. Factors Contributing to Deadstock in the Fashion Industry

Every year, the global fashion business produces about 100 billion garments. Out of this enormous amount, overproduction results in the creation of 92 million tons of solid waste

(Hendriksz, V., 2017). Due to the industry's high consumer-driven and high retailing levels (Jansson & Sjöbohm, 2022), the uncertainty businesses encounter on both the supply and demand sides of the supply chains is what causes overproduction (Wen et al., 2019). It has been estimated that 25% of products produced between 2000 and 2015 will be left unsold (McKinsey & Co., 2021), being destroyed before reaching consumers.

The fast fashion industry is characterized by short-lived trends and unpredictable demand, making it an appropriate target for analysis with the newsvendor model (Cybis & Bernard, 2021). Retailers typically rely on historical sales data to determine order quantities; however, this can be challenging due to the highly stochastic demand for fast fashion products (Qin et al., 2011). Furthermore, fast fashion products are highly dependent on trend cycles and seasonality, which further complicates demand forecasting. To mitigate the risk of stockouts, retailers may place orders that exceed anticipated demand during peak sales seasons, driven by a preference for stockout aversion (Schweitzer and Cachon, 2000). Nevertheless, this approach can lead to overstocking and potential losses if demand falls short of expectations.

Moreover, the fashion industry presents unique challenges since orders must be placed in advance, and buyers are not necessarily risk-neutral, which contradicts the assumptions of the newsvendor model (Cybis & Bernard, 2021). The combination of stochastic demand and variable risk preferences makes it difficult to determine the optimal order quantity for fast fashion products. Further research is necessary to develop more effective SCM strategies for the fast fashion industry, taking into account these challenges (Cybis & Bernard, 2021; Environmental Audit Committee, 2019; Qin et al., 2011; Schweitzer and Cachon, 2000).

However, the presented model serves to elucidate the fundamental economic principle underlying overproduction, highlighting the decision-making process behind it as well as its main driver – demand uncertainty (Lee et al., 1997). In the context of fast fashion garments, which are distinguished by their temporal trendiness and relatively low durability, the imminent obsolescence of these items, combined with their diminished value at the end of the trend cycle, additionally incentivizes their disposal (Cybis & Bernard, 2021).

The presence of uncertainties in conjunction with the utilization of push manufacturing strategies within the fashion industry results in a persistent overproduction of fashion products, which subsequently contributes to an accumulation of deadstock (Jansson & Sjöbohm, 2022). Significant efforts have been made to counteract the unpredictability of demand through the

development and implementation of advanced technology, with the utilization of machine learning techniques being one such example (Acerbi et al., 2021). Despite these advancements, the inherent uncertainties present throughout the supply chain make it highly challenging to produce demand forecasts that are entirely free from overproduction (Wen et al., 2019).

2.2.4. Impact of Holding Deadstock

The impact of holding deadstock is a crucial issue for fashion companies to consider. The presence of deadstock in inventory has been shown to have a significantly adverse effect on operations. As previously mentioned, deadstock results in unrecovered production expenses, along with additional costs associated with the storage, transportation, and management of such inventory, all of which are considered financial losses (Luh et al., 2003). The wasteful use of resources and materials in deadstock production is also highly unsustainable.

Moreover, the rise of fast fashion has heightened the industry's demand for flexibility, as fast fashion retailers face pressure to respond quickly to changing trends and customer demand, placing increased strain on supply chain operations to be adaptable and agile. However, the presence of deadstock can hinder a firm's ability to react promptly to rapidly shifting trends, thereby negatively affecting its market competitiveness (Napier & Sanguineti, 2018).

2.2.5. Deadstock Disposal: Options and Motivations

The ultimate fate of deadstock can take on various forms. In addition to practices of disposal in landfills or incineration, unsold garments may also be exported in bulk for sale in developing nations or be subject to chemical or mechanical recycling processes, thereby transforming them into raw materials for the manufacture of other garments and non-apparel products (Claudio, 2007).

Despite the negative environmental impacts, companies choose less sustainable methods for disposing of their deadstock for various economic reasons. These can include the desire to clear space for new collections, maintain a positive brand image, or take advantage of tax credits for energy recovery through incineration (Cybis & Bernard, 2021). Conventional business practices are guided by reducing expenses associated with waste collection and disposal. Consequently, decisions regarding waste management are frequently made by evaluating the cost-effectiveness of options such as landfilling or incineration versus recycling (Stahel, 2016).

Additionally, the emergence of fast fashion in the industry has accentuated the demand for stock space. In order to keep up with the rapid pace of clothing trends, companies have increased production levels which often results in miscalculations of consumer buying habits, leading to overproduction and the need to free space for new trendy items. In this context, disposing of excess inventory through landfilling or incineration has become a quick and economically favorable option to achieve this objective (Kumar and Malegeant, 2006; Napier & Sanguineti, 2018).

Nevertheless, the elimination of unsold merchandise is not exclusive to the fast fashion industry, but also occurs in the luxury market. In this context, the elimination of fashion items serves to preserve the rarity and exclusivity of luxury brands, thereby preventing the items from being sold at reduced prices (Napier & Sanguineti, 2018). As the brand name is the most valuable asset for luxury brands, destroying deadstock and maintaining high prices is deemed of paramount importance in safeguarding the elite and restricted accessibility reputation associated with these brands (Napier & Sanguineti, 2018).

Furthermore, in certain countries, companies may be eligible for tax benefits when they dispose unsold merchandise. Italy, for example, has established regulations outlined in Presidential Decree 441/97 and mandate n. 193/E of 23/7/98, which allows firms to claim deductions for tax purposes. Similarly, the United States government has implemented a reimbursement program for import-related taxes. According to the United States Customs and Border Protection Agency, if imported merchandise is not used and is exported or destroyed under the customs supervision, 99 percent of the duties, taxes, or fees paid on the merchandise due to importation may be recovered as drawback (Napier & Sanguineti, 2018). Furthermore, tax credits may also be granted for energy recovery through incineration (Cybis & Bernard, 2021).

Despite the availability of more ecologically sound methods for disposing of excess inventory, the most detrimental practices continue to be the norm. This is in part because textile recycling technology is still in its early life (Fontell and Heikkilä, 2017), and the capacity for waste diversion to these alternative methods is limited (Ellen MacArthur Foundation, 2017). Reusing as an alternative is a viable option, but the saturation of the secondary market restricts it in regions with high consumption of clothing (Environmental Audit Committee, 2019). Lastly, another relevant barrier to systemic change contributing to the maintenance of the status quo of disposing unsustainably is the costs of implementing and maintaining sustainable strategies (Kumar and Malegeant, 2006).

2.2.6. Impact of Deadstock Disposal

The disposal of fashion deadstock, due to the nature of the underlying linear economy, is, as described, commonly made through either incineration or landfill disposal, and globally, it is estimated that products valued at 600 million USD are being destroyed by incineration on an annual basis (Napier & Sanguineti, 2018).

Although some energy can be recovered during the incineration process, the activities taken to dispose products prevent the regeneration of resources or the use of recycled goods as production inputs (Jansson & Sjöbohm, 2022). In fact, only 1% of all garments produced are recycled into new garments (McKinsey & Co., 2021).

Previous research has not thoroughly examined the environmental effects of utilizing methods such as incineration and landfilling for disposing of deadstock, as the ramifications of disposing of toxins in an indiscriminate manner are yet to be fully understood in the long term (Napier & Sanguineti, 2018). However, such methods are considered the least desirable strategies in the waste disposal hierarchy, and they are primarily motivated by economic considerations rather than a concern for the environmental impact caused (Kumar and Malegeant, 2006; Jacometti, 2019).

It is imperative for the clothing industry to consider waste management as a crucial aspect of their operations, as achieving true sustainability requires the ability to reintegrate all outputs back into the value chain (Wren, 2022). This reintegration and circular approach are relevant to maintain the environmental or economic value of the product and avoiding harmful impacts on society (Ellen MacArthur Foundation, 2017; Napier & Sanguineti, 2018).

2.3. Sustainable Business Models in the Fashion Industry

Sustainable business models (SBM) can play a crucial role in addressing the issue of deadstock in various industries, including the fashion industry. By adopting sustainable practices and incorporating circular economy (CE) principles, businesses can reduce waste and extend the life cycle of their products. The upcoming section covers the definition of business model, sustainable business model as well as circular business model (CBM), which can aid in comprehending how these concepts can contribute to resolving the issue at hand.

2.3.1. Definition of Business Model

The concept of a business model, which refers to a system of production and consumption exchanges, provides a framework for analyzing the various components of a company's value proposition. This includes the benefits, costs, capabilities, and relationships involved in the firm's operations. The framework allows for the examination of decisions made and the resources utilized to support the value system, enabling scholars and managers to gain a better understanding of how value is created for customers and captured by the firm (Pal & Gander, 2018).

The business model can also be described as a system that outlines how a company transforms its resources into a product or service offering and manages both its internal value chain and external value network, which includes multiple partners involved in the offer (Lecocq et al., 2006). An operational definition of a business model has been put forth by H. Chesbrough and R.S. Rosenbloom (2002), which consists of six key functions: articulating the value proposition, identifying a target market, defining the structure of the internal value chain, establishing revenue generation mechanisms, determining the company's position in the external value chain, and formulating a competitive strategy.

While there is much diversity and contestation in the literature on business models, its role in tracing and analyzing the complex value system of a company is widely recognized (Demil and Lecocq, 2010). The framework provided by the business model concept facilitates a deeper understanding of the generation and organization of value to support the company's value proposition (Zott et al., 2011; Baden-Fuller and Mangematin, 2015).

2.3.2. Sustainable Business Models

Sustainable business models enable firms to harmonize their economic objectives with their sustainability goals, leading to mutual benefits for all stakeholders involved (Rashid A., et al, 2013). According to Porter and Kramer (2011), these models have the potential to provide a competitive advantage through the inclusion of sustainable value propositions, value creation processes, and value capture mechanisms, ultimately resulting in economic benefits for the companies. Boons and Lüdeke-Freund (2013) have identified four distinctive features of SBMs that set them apart from traditional models. These include a value proposition that incorporates both ecological and social values, in addition to economic values and a sense of responsibility towards the company's stakeholders throughout the supply chain.

Geissdoerfer et al. (2018) have summarized various types of SBMs, including: CBMs, which aim to close, slow, intensify, dematerialize, or narrow resource loops; Social Enterprises, which prioritize social impact through economic activity and reinvestment; Bottom of the Pyramid Solutions, focused on serving customers at the lower end of the income spectrum; and Product-Service Systems, which integrate products and services into customer offerings to provide a product, functionality, or result.

Sustainable business model strategies have been extensively discussed in the literature and include: maximizing material and energy efficiency, closing resource loops, substituting with renewable and natural processes, providing functionality instead of ownership, embracing a stewardship approach, promoting sufficiency, repurposing for the benefit of society and the environment, creating inclusive value, and developing scalable, sustainable solutions (Geissdoerfer et al., 2018a).

2.3.3. Circular Business Models

As a means of addressing the detrimental effects of the traditional linear economy, the concept of a CE has been proposed as an alternative. This model prioritizes resource conservation and the continuous use of resources through closed-loop systems (Berardi & de Brito, 2021). The shift towards a CE in production and consumption has the potential to bring about new advantages and opportunities for businesses, both in terms of creating new revenue sources and adopting innovative business models (Colombo et al., 2021).

The concept of the CE has yet to receive a universally accepted definition (Reike et al., 2018). Nonetheless, the essential idea of CE is to optimize the utility of a product throughout its entire lifecycle and across the entire supply chain (Jansson & Sjöbohm, 2022). CE envisions value flow as a cyclical process in which there is no waste and resources are preserved (Stahel, 2016).

In contrast to the traditional linear model of production and consumption, which results in the disposal of waste, the CE emphasizes the repurposing and prolongation of products to extract their full value. Rather than discarding waste, CE utilizes reverse logistics to collect it and then redirects it to the most viable option for repurposing or recycling within the network (Stahel, 2016). The linear economy is defined by its emphasis on cost reduction and high turnover rates, with little consideration given to sustainable development. In contrast, the CE prioritizes circularity and the integration of profitability with sustainability (Kirchherr et al., 2017; Stahel, 2016).

Geissdoerfer et al. (2018) identify CBMs as a type of SBM that seeks to close, slow, intensify, dematerialize, or narrow resource loops. This concept has also been defined by Nußholz (2017) as a way for a company to create, capture, and deliver value with a focus on improving resource efficiency through extending the useful life of products and parts (such as through long-life design, repair, and remanufacturing) and closing material loops.

2.4. On-demand and Made-to-Order Business Models and Deadstock

In the subsequent section, an exposition is presented on the definitions of "on-demand" and "made-to-order" (MTO), along with their proliferation in the fashion industry. Furthermore, the correlation between the aforementioned concepts and deadstock as a prospective remedy is delineated, and their respective advantages and disadvantages are expounded upon.

2.4.1. On-Demand and Made-To-Order Business Models Definition and Emergence

According to the typology of SBMs presented by Geissdoerfer et al. (2018), the on-demand and MTO models can be categorized as a subset of CBMs. This is because the core aim of both approaches is to narrow and optimize the use of resources in the production of clothing, thereby promoting sustainability.

A standardized definition for the term "on-demand" has not been established in the literature. According to the Helen McArthur Foundation (2017), the concept of fashion-on-demand can take on various forms. The base concept of the "on-demand" production model, as described by Davies (2021), entails the production of goods only when and as required. This approach to production differs from the traditional method employed in the fashion industry, where brands anticipate consumer demand and produce or have manufactured a predetermined quantity of each item. Iarocheski (2021) confirms that under the on-demand model, fashion pieces are only produced after the receipt of an order and payment from the customer.

The MTO business model shares similarities with the on-demand approach, as it involves production initiated by the customer upon order placement. Nonetheless, the MTO model involves customization of the product in accordance with the customer's specifications, thereby differentiating it from on-demand (Rajagopalan, S., 2002). In the context of this research, the two business models are considered to have enough similarities to be used interchangeably, as they share the same principles in terms of production.

According to Amed, et al. (2018), the on-demand or MTO production model has emerged as a response to sustainability concerns, as it, by definition, reduces waste. However, it also represents a shift in the fashion industry's paradigm. In the past, fashion trends were imposed upon consumers and determined by fashion editors, designers, and buyers. However, in today's landscape, trends and products are driven by consumer demand, reflecting a "pull" dynamic (Mckinsey & Company, 2019). The impact of social media has been a significant factor in the creation of fashion trends, but it has also led to a decrease in the lifespan of these trends. In our fast-paced and unpredictable world, predicting and adapting to demand has become increasingly challenging, as noted by (Meneses Caetano, 2022).

The growth of the on-demand and MTO production models can also be attributed to the increasing use of automation and data analytics, which allows startups to incorporate greater agility into their production cycles. As a result, mass market players are likely to follow this trend, striving to respond more promptly to consumer demand and evolving trends. This shift is expected to result in a rise in just-in-time production, lower levels of overstock, and an increasing emphasis on small-batch production cycles, according to Mckinsey & Company (2019).

While automation within the clothing industry is currently at a limited scale, emerging technologies present substantial potential to be integrated with on-demand business models. Notable advancements include digital and laser printing for finishing, which allows for local finalization in combination with either automation or low-cost sourcing for the base garment. Other promising innovations include advancements in 3D knitting, semi-automated sewing, and automated logistics. These technologies have the potential to reduce labor intensity, increase customization options, enhance reliability, and shorten production times, as reported by Mckinsey & Company (2019).

2.4.2. On-Demand and Made-to-Order as a Solution to Deadstock

The production of goods after the receipt of an order from the consumer, as seen in the on-demand or MTO model, allows for a perfect alignment of supply and demand, as described by Amed et al. (2018). This customer-centric approach eliminates waste resulting from overproduction, as the stock is manufactured in the exact quantity required, creating a perfect match between supply and demand.

By implementing the on-demand and MTO approach, there is a higher likelihood that all products will be sold, resulting in a reduction of resources used and waste from unsold inventory. In addition to this, the approach has a moderating effect on consumption by generally using quality design and material for increased durability (Christen, 2018). Customization and personalization also allow for higher utilization and emotional durability (McArthur Foundation, 2017), which creates a stronger connection between the customer and their clothing. As a result, customers may reduce their consumption of fast fashion and mass-produced items, which can ultimately decrease the demand for these items and potentially decrease the amount of deadstock created (Christen, 2018).

2.4.3. Advantages and Disadvantages of On-Demand and Made-To-Order

The on-demand or MTO model is primarily associated with sustainability. This approach minimizes waste by producing only what is necessary, reducing resource usage and leading to lower water consumption and environmental pollution (Magnusdottir, 2020). By eliminating unsold inventory or deadstock, the model helps also to eliminate unsustainable waste disposal practices. In addition, the on-demand or MTO approach allows for better control over collections, improving operational efficiency as brands are not burdened with storing and disposing of surplus inventory before launching new products (Davies, 2021). McKinsey & Company (2019) suggests that the on-demand and MTO approach in fashion requires less capital investment and helps mitigate demand uncertainty. Moreover, the absence of inventory costs contributes to a more sustainable approach to small-batch production. Additionally, by aligning supply with demand, garments can be sold at full price, increasing revenue margins for the brand (Meneses Caetano, 2022). The customization of products in the MTO business model is another key advantage, creating items that meet customers' specific requirements and leading to higher customer satisfaction (Rajagopalan, S., 2002).

The on-demand or MTO model is not without its challenges, despite the many benefits. The smaller batch sizes that the model operates with, instead of economies of scale, tend to result in higher production costs (McKinsey & Company, 2019). This can pose a challenge to companies looking to adopt this model, as they may need to consider adjusting their pricing strategies to account for the higher costs. Additionally, the waiting time for customers can also be a challenge as each garment is made-to-order, which may not align with the expectations of today's fast-paced consumers who desire prompt delivery. However, companies can overcome this challenge by implementing clear communication strategies with their customers to manage

their expectations, leveraging advancements in technology to streamline production processes and reduce waiting times, and nearshoring production to reduce transportation times (Meneses Caetano, 2022).

3. Purpose and Research Question

The objective of this dissertation is to explore the on-demand and MTO business models as a potential solution to the issue of deadstock in the fashion industry. The research question posed is: *“Is the on-demand or made-to-order business model a viable and sustainable solution to the problem of deadstock in the fashion industry?”*. This inquiry seeks to determine if the business model effectively combats deadstock and in what way. Additionally, the research question evaluates the feasibility of the widespread implementation of the model and its sustainability.

4. Research Methodology

The current section provides a detailed account of the methodology adopted to address the research question. This segment elucidates the research's design and the rationale behind selecting qualitative research and case studies. Moreover, it delineates the methods employed for data collection and analysis.

4.1. Research Design

The present study integrated a comprehensive literature review with empirical data obtained primarily from semi-structured interviews. The literature review consolidated the latest research findings pertaining to the deadstock problem and the on-demand or MTO business models.

This thesis adopts a qualitative research approach, which is deemed appropriate for the complex and understudied issues of deadstock creation and disposal and the emerging on-demand and MTO business models (Graebner et al., 2012; Birkinshaw et al., 2011). Despite the increasing emergence of SBMs in the fashion industry, there remains limited research on the relationship between on-demand and deadstock. Qualitative research is deemed suitable for the current study as it enables the observation of broad and complex concepts, such as on-demand, in the fashion industry.

To answer the research question, the methodology employs two case study analyses of companies operating under the on-demand and MTO business models. Employing multiple case research aims to enhance the understanding of the phenomenon being investigated by

concentrating on the subject of study that encompasses two or more cases, as described by Stake (2013). By investigating two brands that operate in different segments and markets, this paper aims to provide a complete understanding of the ability of on-demand or MTO to be a sustainable and viable solution for the deadstock problem. Furthermore, to complement the case studies, a fashion industry expert was interviewed to deepen the research and get a broad view of the topic.

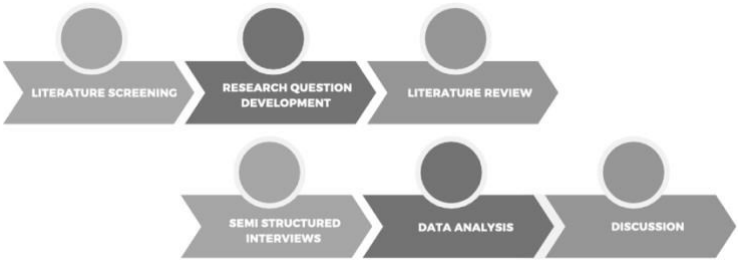


Figure 2. Roadmap of the research process

4.2. Data Collection

The primary data source for the study was semi-structured interviews with one individual per company, namely founder Ciara Louise from Benjamin Fox and production manager Paula Font, from Alohas. The industry expert interviewed for this research was Katia Cahen, Marketing Intelligence Director at Lectra.

The selection of the case study firms was predicated upon the objective of acquiring companies that mirror the existing on-demand and MTO market. Specifically, this entailed the inclusion of a small-scale enterprise, Benjamin Fox, which operates at a lower capacity, and a larger company, Alohas, which offers a more expansive viewpoint of the business model's practices. Due to the stringent selection criteria, the number of cases in this research was limited, as it was extremely challenging to find companies that met the requirements and were willing to participate in the interviews. In total, more than 70 companies were contacted, but only two companies, Benjamin Fox and Alohas, responded positively and were willing to participate in the interviews, highlighting the difficulty of finding companies that met the selection criteria for this research.

The selection criteria employed to identify pertinent experts for the purpose of discussing the topic entailed the requirement for individuals possessing experience not solely within the fashion industry but also with respect to the on-demand business model. The designated role of these experts in the research process is to furnish a more comprehensive perspective on the topic under investigation, augmenting the case-specific data. Katia Cahen, Marketing Intelligence Director at Lectra, met the criteria due to her expertise in the industry and the company's operations in the on-demand market.

The use of a qualitative data collection approach through interviews was deemed suitable for the study's objectives of providing a comprehensive and unobstructed view of the research topic (Yin, 2009). Interviews are advantageous in their ability to elicit detailed and in-depth responses, allowing for a more targeted exploration of the research problem. As such, this approach was effective in ensuring that the study's research questions were addressed in a thorough and focused manner.

Initially, the case study interviews focused on gathering information and background details regarding the companies being interviewed. Subsequently, the interviews were designed to investigate the drivers of on-demand or MTO, its viability and sustainability, and finally, to examine how the business model tackled the issue of deadstock. An interview guide was developed to touch on each of these topics through open-ended questions that would incentivize the interviewee to develop their responses.

The interview with fashion expert Katia Cahen was considered relevant to deepen the research and allow for an understanding of the on-demand or MTO business model in the industry in general, complementing the case-specific information that was previously collected. This interview allowed for a stronger practical knowledge of the fashion-on-demand business model and partially covered the limitation of only having access to a short number of companies for case-study analysis.

The collection of secondary data involved the examination of the websites, social media platforms, and press articles of the enterprises. The selection of relevant documents was based on criteria such as the credibility of the media sources and the alignment of the content with the primary sources. Denzin's (2012) triangulation method guided the research methodology in this data collection process to ensure robustness and accuracy.

Table 1. *Semi-structured interviews*

Interviewee	Date	Company	Position	Interview type	Duration
Katia Cahen	15/03	Lectra	Marketing Intelligence Director	Expert interview	60 min
Ciara Louise	29/03	Benjamin Fox	Founder	Company interview	40 min
Paula Font	1/04	Alohas	RTW Buyer & Production Manager	Company interview	40 min

4.3. Data Analysis

Following the acquisition of primary and secondary data, the collected data was analyzed using thematic analysis, which is a popular method for analyzing qualitative data (Saunders et al., 2015). This method involves identifying recurring themes and patterns in the data related to the research questions by coding the data set. Thematic analysis is systematic, flexible, and accessible, making it a good option for analyzing many documents of data (Saunders et al., 2015; Braun & Clarke, 2006). It ensures converged data, leading to understanding the overall case, which is sought when investigating open-ended research questions. The coding process was then applied and conducted in accordance with the framework suggested by Braun and Clarke (2006).

Table 2. *Thematic analysis framework. “Phases of the thematic analysis” (Braun & Clark, 2006: 87)*

Phase	Description of the process
1. Familiarizing with the data	Transcribing, reading, noting initial ideas.
2. Generating initial codes	Systematically coding the data across the data set finding patterns.
3. Searching for themes	Coding codes into potential themes, gathering data for each theme.
4. Defining and naming themes	Refining specifics of each theme, uncovering specific patterns.
5. Producing the report	Final analysis of selected extracts, relating data with research question, extracting relevant examples, producing the report.

The methodology recommended by Braun and Clarke (2006) was followed in this study. To address the research questions, codes and themes were derived inductively from the theoretical background provided in the literature review and then deductively from the interview transcripts. Narrative coding was used to generate the initial codes, which involved developing codes that best encapsulated the essence of the information being analyzed (Saunders et al., 2015).

Table 3. Coding framework showing identified themes and related codes

Theme	Sub-themes	Codes
Drivers	Financial	Low initial investment
	Sustainability	Core business-model
Viability	Advantages	Financial Reduced waste Customization Optimization Market testing
	Disadvantages	Fabric management Longer lead times Impatient customers
Sustainability	Materials	Leftover fabrics Shipping from abroad
	Business model	No deadstock Optimization of resources Global reach
	Workforce	Local Ethic
	Waste management	Reuse of leftovers Reselling of returns
Deadstock	Waste	Fabric leftovers Returns
	On-demand advantages	No excess inventory No seasonality excesses

5. Empirical Setting

In this section, both the case study and the expert's companies are described to serve as a base setting for the empirical analysis.

5.1. Lectra

Lectra is a prominent French technology company that provides advanced solutions for various industries dealing with soft materials such as textiles, leather, and composites. The company was established in 1973, and it offers high-tech innovations for the complete product development and manufacturing process. Lectra's primary focus is on sustainability, and it helps its clients generate superior and environmentally friendly products while also boosting their productivity and profitability.

Lectra has a significant commitment to innovation, and it maintains an advanced research and development center in Bordeaux-Cestas. The company's solutions are custom-made to satisfy the diverse requirements of industries such as fashion, automotive, furniture, and aerospace.

Apart from its comprehensive product offerings, Lectra also has an on-demand solution that enables its customers to create personalized products based on their measurements and specifications using industrial-scale production. This cutting-edge solution assists brands in providing customized products while streamlining their operations and minimizing waste.

5.2. Benjamin Fox

Benjamin Fox is a brand that is deeply rooted in the art of pattern design and dressmaking. Inspired by vintage sewing patterns, particularly the silhouettes of 1970s nightwear, and the dresses that were handmade for her and her sister by her mother, founder Ciara established the brand in 2020 after graduating with a Bachelor of Laws from University College London.

The brand's ethos centers on the idea of exploring femininity and uncovering new silhouettes through the meticulous process of handmaking dresses. At Benjamin Fox, each piece is handmade in the UK with the utmost care and attention to detail, either by Ciara in her North Norfolk studio or by a small team of skilled seamstresses and dressmakers across the UK. The team counts with around 10 members, making Benjamin Fox a small enterprise.

The brand uses a MTO process as a nod to the time-honored traditional way of working and as a means of reducing the possibility of excess stock. Additionally, sourcing fabrics of the highest quality is of paramount importance to Benjamin Fox, and the brand works with reclaimed, deadstock, vintage, or leftover cloth, mainly originating from the UK and other European countries.

5.3. Alohas

Alohas is a Spanish brand that offers a unique collection of high-quality shoes, accessories, and clothing at an affordable price point. Founded in 2015, Alohas' products are inspired by the rich cultural heritage of Spain, with a touch of modernity and innovation.

What sets Alohas apart is its commitment to sustainability and social responsibility. Each product is carefully handmade in Spain by artisans using traditional and artisanal techniques, using quality materials. The brand is dedicated to promoting sustainable fashion practices and reducing its carbon footprint through responsible manufacturing and ethical sourcing. The brand counts with 100-200 employees, making it a medium to larger-sized enterprise.

Alohas' shoe collection features a wide range of styles, from comfortable sneakers to elegant sandals and boots, each designed with meticulous attention to detail and crafted to provide a comfortable fit. Their accessories range includes sunglasses, bags, and jewelry, each designed to complement their footwear line and add sophistication to any outfit. Recently, the brand has also developed clothing lines following the same principles.

Alohas is also dedicated to providing excellent customer service, with free shipping and returns, flexible payment options, and a transparent supply chain. To reduce waste and minimize its environmental impact, Alohas uses an on-demand production model that allows the company to produce items only as needed. This lean inventory model allows Alohas to respond quickly to customer demand while reducing its carbon footprint.

6. Empirical Findings

The purpose of this chapter is to answer the research question: "*Is the on-demand or made-to-order business model a viable and sustainable solution to the problem of deadstock in the fashion industry?*". To accomplish this goal, each identified theme and subtheme, as presented in Table 3, will be thoroughly analyzed, and described using the corresponding coding framework.

6.1. Case Study Analysis

6.1.1. Business Model and Practices

Benjamin Fox specializes in MTO products. Ciara, the designer and developer, designs unique pieces and develops and photographs them for the website and social media. Clients can browse through the website and order their preferred item, choosing their size based on UK sizing measurements. The website clearly informs customers that it takes around five weeks for the product to be ready and dispatched.

In addition to the standard sizes, customers can request custom sizing and any other alterations they may want to make the product tailored to their preferences. This ensures that each customer gets a piece that fits them perfectly and suits their individual style. The average ticket in Benjamin Fox is around 375€.

Alohas describes its business model as on-demand, with new collections launched twice a month featuring 10-15 different models. The company closely monitors customer reactions and purchases to gauge interest in each item. To encourage customers to buy on-demand, Alohas offers a 30% discount to those who purchase within the first two weeks of a collection's release, in the “pre-order” stage, and a 15% discount when production begins, at the “production” stage.

Following the product release, Alohas reviews all received orders after a period of four weeks to determine whether to proceed with the production of each item based on the minimum order quantity set by the manufacturers. In cases where a product fails to meet the specified quantity, the company notifies the concerned customers about the unfulfilled requirement. It is noteworthy that such occurrences are infrequent, with Alohas reporting a cancellation rate of 5% to 10% owing to their expansive online market reach. The average value of purchase at Alohas is estimated to be approximately 150€.

Alohas, therefore, follows a production protocol wherein products are produced only after the purchase has been completed. However, it is noteworthy that customization of the products is not offered by the company. Clients are able to check the shipping times for the products they wish to order to enable them to make informed purchase decisions. It should be noted that not all products have similar shipping times, as they may be in different stages of production. This includes products that are categorized as “pre-order”, “production”, or “stock”. It should be

acknowledged that a product is only considered to be “in stock” at Alohas if it has been returned by a customer, as the company does not produce for stock.

6.1.2. Drivers for Producing On-Demand and Made-to-Order

Ciara, the founder of Benjamin Fox, opted for a MTO manufacturing model at the outset due to financial constraints. The high costs associated with quality fabrics and labor-intensive production methods made it economically unfeasible to produce items in large batches, in the beginning. Nevertheless, Ciara recognized later that producing products MTO could significantly reduce waste, ensure sales, and offer customers a personalized experience. In essence, although the initial impetus was financial, the advantages of MTO manufacturing align seamlessly with Benjamin Fox's core values of craftsmanship, sustainability, and customer satisfaction.

Alohas' decision to adopt an on-demand business model was driven by its commitment to sustainability. For the company, sustainability is not limited to the use of environmentally friendly materials such as recycled, organic, or deadstock but also encompasses the incorporation of sustainable practices at the core of its business model. Alohas acknowledges that the traditional approach to manufacturing and retailing entails producing large quantities of products in advance, which often results in excess inventory, waste, and inefficiencies. On the other hand, an on-demand model allows Alohas to manufacture items solely in response to customer demand, thereby reducing waste and mitigating their environmental impact. Additionally, this approach ensures that the company does not accrue unsold inventory, which can be costly both financially and environmentally. Overall, Alohas perceives on-demand as the most efficient approach to integrating sustainability into its business practices, and this served as the primary motivation for its adoption.

6.1.3. Viability of Producing On-Demand and Made-to-Order

6.1.3.1. Advantages

Ciara, the founder of Benjamin Fox, highlights several advantages of the on-demand manufacturing model. Firstly, customers perceive the products as more special due to the effort that goes into building them to order and the high quality of materials used, including the use of leftover fabrics. The option for customers to customize details to their preferences further enhances the uniqueness of each product, providing a bespoke experience that sets the brand

apart from its competitors. Ciara notes that a significant portion of Benjamin Fox's customer base consists of repeat customers, which emphasizes the notion that the tailoring and sustainable approach adopted by the brand fosters consumer loyalty.

Additionally, as mentioned in the “Drivers” section, there is no initial investment in batch production, as production only occurs when an order is placed. This guarantees that there will be a sale and significantly reduces the financial risk associated with traditional manufacturing. Ciara also emphasizes as an advantage that the MTO model also reduces waste as there is no excess stock, optimizing the use of materials and labor and minimizing the brand's environmental impact.

Besides the mentioned environmental and waste reduction advantage, Alohas has found that one key advantage of the on-demand business model is the financial benefits of this approach. Paula states that by using an on-demand model, Alohas is able to receive cash flow before production, which helps to mitigate the risks associated with traditional manufacturing and retail. Rather than investing in large amounts of inventory upfront and hoping that it will sell, Alohas is able to generate revenue as orders come in, which helps to improve its financial stability.

Another significant advantage of an on-demand model is that it allows for a reverse marketing initiative that offers customers discounts when they pre-order within the two weeks after the launch of a new design. By offering these discounts at the beginning of a season rather than waiting until the end, Alohas is able to incentivize customers to order early, which helps to maximize production economies of scale, as the company gets most of the orders in a specific period. This approach also allows Alohas to test the market and gain insights into what customers want, which helps to inform and properly develop their future collections and designs.

In addition, the on-demand model allows Alohas to work more closely with its suppliers, which has benefits for both parties. By being precise with their production, Alohas can better align their business with suppliers, creating a more predictable and stable relationship. This level of collaboration allows Alohas to ensure that they are producing the right amount of product with the right materials and at the right time.

Finally, Paula mentioned that an on-demand model allows Alohas to create a more customer-centric business model, where the focus is on meeting the needs and desires of its customers

rather than pushing products on them. By testing the market and understanding what will sell, Alohas can create a pull model that is driven by customer demand rather than a push model that is driven by the company's desire to sell as many products as possible. This approach creates a more sustainable and profitable business model that benefits both the company and its customers.

6.1.3.2. Disadvantages

Ciara, from Benjamin Fox, acknowledges that on-demand manufacturing presents various benefits, but there are specific challenges that must be addressed when implementing this model. Firstly, fabrics are primarily purchased on-demand, which implies that they are ordered only after the products are ordered. However, sourcing fabrics can be a complicated process since some fabrics are rare, resulting in longer lead times and adding stress to the production process. Additionally, there may be delays in receiving the ordered fabrics from suppliers located abroad, which can also have an impact on production timelines.

Ciara also acknowledges the difficulty in predicting how long her limited fabric supply will last, as some fabrics are not always readily available in the supplier's stock for reordering. This uncertainty can pose a challenge to the production process, necessitating careful management and planning to ensure that products can be manufactured in a timely manner.

Moreover, customers can be impatient and may not understand the lead times required for MTO products, causing stress for Ciara and her team. Ciara notes that customers may not be accustomed to waiting for products, as traditional business models typically offer faster turnaround times, and may not fully understand the MTO process, leading to impatience and frustration. To overcome this, she makes sure to inform customers on the company's website about the time it takes to ship a product, maintains close communication with them via email, and shares behind-the-scenes updates to foster transparency and build trust. She also emphasizes the unique and limited nature of her fabrics, which may cause slight delays in the production process, but ultimately result in a more personalized and special product for the customer.

During the interview, Alohas production manager Paula also discussed the several obstacles that the company faces when using an on-demand business model. One of the main challenges is the short production time of only six weeks given to the suppliers, which means that they must work efficiently to meet demand. However, any unexpected issues, such as a shortage of

raw materials, can cause significant problems and delay the entire process. This, in turn, can increase the waiting time for customers, which is already longer than in traditional retail.

During the interview, Paula addressed a supplier-related matter pertaining to the necessity of local production and the difficulties it entails. Alohas has adopted a strategy of local manufacturing to ensure shorter lead times and greater control over the production process. Nevertheless, this approach may come at the expense of not working with suppliers who possess cutting-edge on-demand technology. Paula noted the challenges of identifying Spanish manufacturers that offer on-demand advanced technology and cited the brand's decision to prioritize local production and avoid logistical issues related to shipping and transportation as reasons why they do not collaborate with larger manufacturers. However, Alohas maintains close relationships with its suppliers and is committed to supporting their technological advancement by increasing production volume as the business expands and finding ways to provide economic support.

Another challenge that Alohas faces with on-demand production is the problem of returns. Customers may purchase multiple sizes of the same product to ensure the perfect fit after the long waiting period, which goes against the concept of producing only what is sold and used. Alohas is looking at setting up pop-up stores to give customers the opportunity to experience the product and get a better idea of which size is right for them.

The lead time for on-demand products is once again described as an issue. Paula exposed the different willingness to wait across Alohas product range. While customers may be willing to wait longer for high-quality shoes, they may not have the same patience when it comes to ready-to-wear clothing. Alohas deals with finding a way to differentiate itself from other players in the market and convince customers that the wait is worth it. Paula suggests that having a strong brand identity, with classic and high-quality products that are always in style, is one solution to this problem.

Another challenge of the on-demand model is keeping up with rapidly changing trends. While Alohas can react quickly to new trends by showcasing new designs in their drops, the long lead time means that the product may no longer be in vogue by the time it reaches customers. To balance trends with the on-demand model, Alohas is focusing on having a strong brand identity and best-selling products that never go out of style. Paula acknowledges that *“it is not possible*

to have the best of both worlds” and that the company must find a balance that works for its customers and business.

6.1.3.3. Costs and Pricing

The adoption of an on-demand model impacts Benjamin Fox's costs and pricing strategy in several ways. Firstly, Ciara notes that the cost of fabrics is much higher since she does not buy in bulk, and they are usually quality leftover fabrics, which are more expensive. Additionally, the cost of getting a skilled and local workforce in the UK is also high. However, Ciara feels that she can push the price higher for MTO products when contrasted with the price she would put on a piece that is not MTO. Her underlying assumption is that her target consumer base places a high value on sustainable products and therefore is willing to pay a premium for such offerings. Additionally, she has found that limiting production to only those products and fabrics that have demonstrated market demand allows for cost optimization, as she pays only for the workforce necessary to produce those goods.

In the interview with Paula from Alohas, the impact of on-demand production on costs and pricing strategy was also thoroughly discussed. According to Paula, costs are generally higher for on-demand production because companies cannot negotiate with suppliers based on large quantities. Instead, they focus on reaching the minimum order quantity in order to work with these suppliers. Even acknowledging the savings regarding inventory costs, Paula states this results in a higher production cost per unit.

Despite the increased costs, Paula also believes that customers are willing to pay a higher price for their products. She attributes this to a number of factors, including the company's on-demand business model and the rewarding marketing strategy which offers discounts for pre-ordering. This approach serves as a reward system that is highly valued by their customers, as it demonstrates the company's appreciation for their support of SBMs.

Furthermore, people are also willing to pay a higher price due to the exceptional quality of Alohas products. Paula believes that this quality not only justifies the increased price but also compensates for any waiting time associated with on-demand production. In her view, the willingness of customers to pay a premium for Alohas products is, therefore, a result of a combination of three factors: the sustainability of their business model, the high quality of their products, and the rewarding nature of their discount system for pre-orders.

6.1.4. Sustainability

Benjamin Fox's sustainability practices are centered around the use of leftover fabrics and a MTO production process that minimizes waste. Ciara, the owner of Benjamin Fox, avoids the term "*sustainable*" because she finds it to be a broad and imprecise concept that means different things to different people. However, the company's commitment to reducing waste is evident in its use of deadstock fabrics, which are sourced locally whenever possible. While shipping these fabrics from abroad is not the most sustainable practice, Benjamin Fox never throws excess fabrics away and always finds a way to use them for different purposes.

In addition to using leftover fabrics, Ciara mentions Benjamin Fox's MTO production process reduces waste by definition, ensuring that only products that will sell are produced, as mentioned. Ciara believes that this approach not only benefits the environment but also the company's bottom line.

Finally, Benjamin Fox's commitment to sustainability extends to its workforce practices. Everything is made in the UK with ethical working policies, ensuring that the company's operations have a positive impact on the local community. Additionally, Ciara is open to making changes to a product if a client is not happy to avoid it going to waste. Overall, while Benjamin Fox may not use the term "*sustainable*" explicitly, their commitment to reducing waste and producing ethically aligns with many of the principles of sustainable business practices.

When it comes to Alohas, the company has implemented several sustainable practices in its business operations, and the on-demand production model plays a significant role in promoting these practices. The on-demand model inherently fosters sustainability by eliminating excess stock, aligning resources with demand, and encouraging mindful production. This approach reduces waste and minimizes the environmental footprint of the company, Paula mentions.

However, Alohas acknowledges that their model does not completely close the loop. There are still challenges to be addressed, such as dealing with returns and occasionally increasing production beyond the number of orders to meet the minimum order quantity required by suppliers. Despite these obstacles, the company's data-driven business model and global reach help mitigate the impact of returns. For instance, Paula mentions that if a seasonal item like a sandal is returned out of season in Europe, Alohas can still sell it in Latin America, where it is

in season. This flexibility, enabled by their digital presence and online sales, optimizes available stock and brings them closer to closing the loop.

Another sustainable practice adopted by Alohas is local production. By producing its products in Spain, the company reduces the environmental impact of its supply chain and supports local communities and economies. This commitment to local production demonstrates Alohas' dedication to both environmental and social sustainability, further solidifying its reputation as a responsible and forward-thinking company.

6.1.5. Elimination of Deadstock with On-Demand

Benjamin Fox still produces waste in the form of small offcuts, which is a common issue in the fashion industry. However, Ciara believes that Benjamin Fox's MTO model is an ideal way to address the issue of overproduction and deadstock. This eliminates the company's need for storage and disposal of deadstock, reducing waste in the process.

When asked if a MTO business model is a perfect solution for deadstock elimination, Ciara acknowledged that while it surely represents a sustainable approach to production, it may not be suitable for larger brands due to the complexity of logistics. She mentions the requirement of organization and planning to ensure that the fabrics are enough, and that the production process runs smoothly. Ciara believes it is easier for smaller brands to adopt the MTO model, which suits their unique approach to production. Moreover, the founder emphasizes that the MTO model requires consumers to be patient and interested in sustainability to wait for their clothes to be made. Ciara highlights that the general consumer is not ready to wait, and it requires a certain type of person to value sustainability and uniqueness enough to wait for their clothes.

During the interview with Alohas, the topic of deadstock and the potential for on-demand production to address this crisis in the fashion industry was also discussed. Paula acknowledged that Alohas still produces some waste, including returns, products that do not meet the desired quality standards, and excess fabric or other raw materials. However, the company is always looking for sustainable ways to deal with this waste.

Despite not being perfect, Paula believes that the on-demand model significantly reduces the amount of deadstock produced by Alohas compared to traditional business models. She sees

on-demand production as a step in the right direction for addressing the deadstock crisis in the fashion industry.

Regarding the question of whether on-demand production is the ultimate solution to the deadstock crisis, Paula believes that it can help, but the responsibility does not solely lie with businesses. Rather, she emphasizes the importance of consumer behavior in addressing the issue. She argues that people need to buy less and make more intentional purchases, such as buying second-hand items or investing in higher-quality products that last longer.

While on-demand production is a valuable tool in reducing waste and deadstock, Paula highlights that it still introduces new products into the market. The most effective solution, she contends, would involve a change in consumer behavior that discourages overproduction and the constant pursuit of new trends. This shift in mindset, coupled with sustainable business practices like on-demand production, could make a significant impact in tackling the deadstock crisis in the fashion industry.

6.2. Expert interview

6.2.1. Fashion Industry's Shift Towards Demand-Based Production

According to Katia Cahen, an expert in the fashion industry and member of French company Lectra, the fashion market does not require everything that the industry produces. For years, the industry has operated by producing a vast amount of goods in bulk and attempting to force these items onto the market. This has resulted in a surplus of unsold inventory, which brands then attempt to sell through promotions at discounts that reach 40-50%. As Catia explains, this results in lower margins and profits, which is unsustainable. This approach has been the norm for the fashion industry for the past 20-30 years, but it is no longer feasible. As a top strategic priority for fashion CEOs, the challenge now is to figure out how to produce only what the market demands. Therefore, Catia finds the topic of fashion-on-demand extremely important and useful to explore. However, she states in a pragmatic way that producing 100% on-demand is extremely hard in today's industry in a large and scaled way.

6.2.2. Technology and On-Demand Production in the Fashion Industry

According to Katia, on-demand production requires the use of high-end technology to be successful. By leveraging technology, companies can reduce the time it takes to produce a product and be more agile in reacting to fast-moving trends. These technologies include the

implementation of appropriate machines, software, and dashboards to manage the production process efficiently. In addition, the use of data is essential for segmenting collections and managing sourcing in an agile manner, in Katia's view.

Katia explained that while the technology that supports on-demand production is fairly mature in terms of the necessary hardware and software tools available, integrating these technologies into the overall supply chain and production process remains a complicated process that requires significant coordination and planning.

Despite the progress made, Katia stressed that the maturity of this topic and how to implement these technologies in production and in the fashion value chain is still not mature enough, as there are still several challenges in fabric management, production management, and collection management. She added that the on-demand business model does not only concern production, as it affects the whole value chain, such as getting raw materials on-demand, producing goods in a timely manner, and having appropriate marketing to help customers understand potential longer shipping times.

6.2.3. Challenges of On-Demand Fashion Production

According to Katia, brands struggle to find the right manufacturers for on-demand production. On-demand production is a sensitive topic for brands as they are under pressure from the market and final customer sales. While manufacturers are accustomed to dealing with mass production, they are still struggling to manage small quantities, including how to manage the production schedule, fabric supply, and attributing the right order from brands to the right manufacturing capacity.

Even though technology and software can help with on-demand production, managing the material supply remains a challenge, especially since most fabrics are produced in China and the Asian region. Sourcing materials from local suppliers results in more expensive production costs, despite the proximity advantages in logistics terms.

The interviewee emphasizes that data is key to segmenting collections and managing the sourcing process in an agile way to diversify the supply chain. In the future, the fashion industry will likely reduce what they consume and produce and focus more on on-demand production, but it is not feasible yet, Katia explains. Therefore, brands need to rethink their business models to make them more sustainable and avoid deadstock, which is expensive.

6.2.4. On-Demand & Never-Out-Of-Stock Fashion Production

According to Katia, the proposal of a new way of thinking about fashion production, with a focus on data and segmenting the collection to produce what the market wants, has the potential to revolutionize the industry.

This solution is based on a multi-business model approach, combining on-demand with traditional manufacturing processes. She suggests having a never-out-of-stock collection as the basis of the brand's offerings, which includes basic items that can be produced in bulk in lower-cost regions, such as Asia or Turkey. These items are meant to be seasonless and always in the collection, meaning they never become deadstock, reducing waste and avoiding selling on promotions. Meanwhile, a seasonal collection that is agile and responsive to consumer trends can be produced on-demand with the ability to add small series of high-value items based on consumer demand. This implies the company has a local manufacturer who can cover small order quantities to reproduce these items quickly and efficiently. This approach enables brands to optimize their collection and production and reduce waste by producing smaller quantities of best-selling and trendy items. At the same time, it allows for brands to have less on-demand production to manage, which copes with part of the challenges Katia mentioned previously.

7. Discussion

7.1. On-demand or Made-to-Order Business Model: Solving Deadstock Problem and Advantages

From the interviews and previous research, one can conclude that the on-demand or MTO business model successfully solves the problem of deadstock in the fashion industry. This happens due to the alignment between production and demand, which produces no excess stock. However, Paula from Alohas acknowledges that the model is imperfect, as companies still have to deal with returns. Despite this, the on-demand or MTO model is a close-to-perfect solution for avoiding excess stock, reducing waste and environmental impact, and improving business operations' efficiency.

Furthermore, it can be concluded that the business model is sustainable due to the resource optimization it implies. Alohas and Benjamin Fox, the companies interviewed, also prioritize sustainability in their practices. While Benjamin Fox focuses on reducing waste and producing ethically through the use of leftover fabrics, Alohas implements sustainable practices such as

local production in Spain to reduce environmental impact and support local communities. Alohas' data-driven business model and online sales also help them mitigate the impact of returns and optimize available stock. Overall, the on-demand or MTO business model aligns production with demand, reducing waste and excess stock, making it a sustainable solution to the deadstock problem in the fashion industry.

In addition to solving the problem of deadstock, the on-demand or MTO business model offers several other advantages. Companies interviewed have highlighted various benefits of on-demand or MTO manufacturing. For Benjamin Fox, MTO production allows for a highly personalized experience for customers and optimizes the use of materials and labor. Additionally, it guarantees sales and significantly reduces the financial risk associated with traditional manufacturing. Alohas, on the other hand, finds that on-demand production allows for the implementation of sustainable practices at the core of their business model. It generates revenue as orders come in and enables them to test the market and gain insights into what customers want. This business model also allows for a more customer-centric approach, closer collaboration with suppliers, and better alignment of business operations. Furthermore, on-demand and MTO can create a pull model driven by customer demand rather than a push model driven by the company's desire to sell as many products as possible.

The adoption of an on-demand or MTO production model also has a profound impact on the costs and pricing strategies of companies. While both brands have noted an increase in production costs due to the inability to negotiate with suppliers based on large quantities, they have also found ways to optimize costs by limiting production to only products with demonstrated market demand. Moreover, both brands have leveraged their on-demand or MTO business model to command premium prices, which they attribute to the sustainability of their operations, the exceptional quality of their products, and their rewarding marketing strategies. Ultimately, these factors have enabled them to maintain profitability and continue expanding their customer base.

7.2. Challenges of On-Demand and or Made-to-Order Production Lead Times

Although the on-demand and MTO business model offers several advantages and appears viable and sustainable in theory, the interviews conducted have revealed major challenges. Extended lead times resulting from on-demand production pose difficulties for brands to respond quickly to market trends, increase waiting times for customers, and lead to return

problems. Problems with fabric management and unexpected production issues exacerbate these challenges.

The extended lead times inherent in on-demand or MTO business models are attributable to the smaller batch production approach and the related difficulties in fabric management. Ciara, the founder of Benjamin Fox, described the challenges she faces in sourcing and managing fabric, as she typically only purchases materials after an order is placed. The purchase of fabrics may not always be a quick and straightforward process, leading to management difficulties. Katia, a fashion expert from Lectra, provided a broader perspective on this issue, noting that most material supply originates from the Asian region, which increases lead times, and that sourcing fabrics locally often entails higher prices. The interviews indicated that managing production timing and all associated components is a significant challenge for on-demand or MTO business models.

Both Alohas and Benjamin Fox have also shared their concerns regarding the impact of longer lead times on their business operations. On-demand or MTO production entails initiating the production process only after receiving an order, creating pressure and stress to expedite the production time. Such pressure also magnifies the impact of unexpected production issues on business operations. To address this issue, brands are compelled to produce locally, enabling greater control over the production process. However, this also means they cannot work with suppliers possessing the latest technology, resulting in an additional disadvantage.

An additional challenge associated with longer lead times is the extended waiting time for customers to receive their products, compared to traditional business models. Ciara from Benjamin Fox highlighted that customers tend to be impatient and may not fully comprehend the nature of MTO purchases, causing business stress. Paula from Alohas stated that customers' willingness to wait depends on various factors, such as product type and quality, and that it has especially been a challenge for their ready-to-wear clothing segment. Both brands acknowledged that considerable differentiation in products and branding is crucial for on-demand production to succeed, as customers may opt for traditional channels and brands otherwise. Additionally, strong communication and marketing of the on-demand and MTO business model are extremely important to have customers aware of how they are contributing towards more sustainable fashion practices. Both brands expressed concerns about the level of consumer readiness to wait for a sustainable, high-quality product and recognized that this may still be a niche market.

Furthermore, longer lead times and cause distress in collection management and in following trends. In the fast-paced world of fashion, trends can come and go quickly. On-demand and MTO brands, which have longer production times, may struggle to keep up with the latest trends and respond to market demand in a timely manner. As Paula from Alohas mentioned, even if a company designs a trendy product quickly, by the time it reaches the customer, the trend may have already passed. Therefore, on-demand and MTO brands need to focus on building a strong brand identity that resonates with their customers rather than solely relying on being the first to hop on the latest trend. By developing a solid foundation of classic and timeless products, on-demand and MTO brands can mitigate the risk of being left behind by the constantly changing fashion industry. Additionally, these brands may need to invest in identifying and predicting longer-lived trends that will remain popular for a sustained period, as fast-changing trends are difficult to follow.

Finally, the prolonged waiting times for on-demand products are leading some customers to order multiple sizes of the same product to ensure a perfect fit, with the intention of returning unwanted items later. This practice causes significant issues for on-demand brands, as it goes against their fundamental business model of producing only what is demanded without having any extra stock. The return of unwanted items can result in excess inventory, which is costly to manage and undermines the efficiency and sustainability of the on-demand production model.

A significant challenge exacerbating those previously mentioned is the difficulty in finding suitable manufacturers capable of producing small batches efficiently. According to Katia of Lectra, most manufacturers are not accustomed to producing smaller quantities and face challenges in managing production schedules, fabric supply, and matching the right orders from brands to the appropriate manufacturing capacity.

7.3. Technology Challenges in On-Demand and Made-to-Order Fashion Production

The main challenges encountered by companies producing on-demand or MTO are largely due to longer lead times. Fortunately, there are technologies available that can potentially reduce production time, such as product management software, digital printing, 3D-printing and automated cutting machines. If integrated with the on-demand business model, these technologies can reduce production timing pressure, enable quicker responses to trends, and minimize waiting times for customers, which in turn reduces the likelihood of them returning

products due to poor fit. According to Katia, on-demand production requires advanced technology for it to be successful and scalable in the fashion industry.

Despite recent developments in on-demand and MTO technology, integrating these technologies into the overall value chain remains a challenge. The necessary management and planning are not yet mature enough, as Katia points out. In fact, issues related to fabric and production management still remain prevalent, and the on-demand approach affects the entire value chain. The knowledge required to manage these challenges is still not present in the market.

7.4. Hybrid Approach: Combining On-Demand and Traditional Manufacturing

Taking into account Katia Cahen's insights, a more balanced approach to tackling the deadstock problem in the fashion industry can be considered as a starting point. This approach combines the strengths of both on-demand and traditional manufacturing methods, allowing companies to optimize their collections and reduce waste while managing the challenges associated with on-demand production.

In this hybrid model, brands maintain a core collection of seasonless, never-out-of-stock items, which can be produced using traditional manufacturing methods. This core collection serves as a stable foundation, ensuring a continuous supply of essential products and mitigating the risks of deadstock and markdowns. At the same time, it enables companies to take advantage of the economies of scale associated with bulk production.

Simultaneously, a seasonal collection that is agile and responsive to consumer trends can be produced using the on-demand model if leveraging the correct technology. By leveraging data and market insights, companies can effectively identify best-selling and trendy items, producing smaller quantities as needed. This reduces waste and aligns production with consumer demand while maintaining a strong brand identity. Furthermore, the hybrid approach simplifies the management of on-demand production by limiting it to a subset of products. This may decrease the implementation and fabric management struggles typically associated with the on-demand model. The hybrid approach offers a more flexible and adaptable solution, enabling companies to reap the benefits of both on-demand and traditional manufacturing processes. This enables brands to balance sustainability and efficiency while addressing the challenges associated with on-demand production.

Furthermore, this model encourages a more customer-centric approach, as brands can actively respond to market trends and demand, fostering a stronger connection with their target audience. The hybrid approach, which combines on-demand production with traditional manufacturing processes, may provide a more feasible and practical solution to the deadstock problem in the fashion industry. This model allows brands to optimize their collections, reduce waste, and manage the challenges associated with on-demand production while leveraging the strengths of both manufacturing methods.

However, this approach still requires companies to collaborate with local manufacturers who possess the right technology to quickly and efficiently reproduce high-value items, to address the challenges of lead times mentioned. This way, even though the model would only be applied to a smaller set of products easing its management, the market is still required to reach a certain level of maturity to make the hybrid approach possible.

7.5. Linking Research Findings with Existing Literature

When comparing the findings of this research with existing literature, it becomes evident that there is a strong alignment between the two, as well as several new insights that contribute to a deeper understanding of the subject matter.

In terms of corroborating existing literature, this research supports the assertion that on-demand and MTO models help reduce deadstock in the industry. The sustainability benefits associated with these models, such as reduced waste, lower resource usage, and minimized environmental impact of supply chains, are also supported by the findings. Another key similarity between the research findings and existing literature is the emphasis on customization in MTO models, which leads to increased customer satisfaction and an emotional attachment to the product. Furthermore, the research confirms the observations presented in previous literature that highlight the impact of technology on the on-demand market and its contribution to the growth of this sector. Lastly, the disadvantages of the on-demand and MTO models, as identified in the research findings, align with those reported in existing literature, including higher production costs due to smaller batch sizes and longer lead times for customers.

In relation to the findings that contribute new insights to existing literature, several noteworthy points emerge. Firstly, previous literature has not yet explored the potential of a hybrid approach, combining traditional manufacturing and on-demand models, as a solution to deadstock. This research sheds light on the advantages of such an approach and its potential

impact on the industry. Additionally, existing literature has not delved into the fabric management challenges associated with on-demand production. This research highlights the complexities involved in managing fabric inventory for on-demand models and the potential implications for businesses. Moreover, while the literature acknowledges that smaller batch productions lead to higher costs, it does not explore how companies can navigate this challenge by adjusting their pricing strategies. This research provides a deeper understanding of the cost and pricing strategies required for businesses adopting on-demand and MTO models. Lastly, although previous literature acknowledges the role of technology in streamlining on-demand production processes, it does not discuss the current maturity and challenges still present in perfecting these technologies. This research offers valuable insights into the existing barriers and the potential future developments in technology that could further enhance the on-demand and MTO models in the fashion industry.

8. Conclusion

8.1. Findings and Conclusion

In conclusion, the on-demand business model has proven to be a viable and sustainable solution to the problem of deadstock in the fashion industry. By aligning production with demand, it reduces waste and excess stock while optimizing resources and fostering sustainable practices. However, the model also presents significant challenges, such as extended lead times, difficulties in fabric and general management, and problems with returns. While advancements in technology offer potential solutions to some of these challenges, their integration within the value chain is not yet seamless.

A hybrid approach that combines on-demand and traditional manufacturing methods has been proposed as an alternative solution, which addresses some of the challenges associated with the on-demand model. At the current market maturity of on-demand technology and implementation, this hybrid approach may seem like a more viable solution. However, it is important to note that the hybrid model is not a perfect solution but rather another option that tackles part of the on-demand challenges.

Ultimately, as technology and implementation continue to evolve, the market may become more prepared to embrace the on-demand business model and overcome the associated challenges. It is crucial to continue exploring and refining the on-demand model, as it holds the

potential to revolutionize the fashion industry by aligning production with demand, reducing waste, and fostering sustainability.

Furthermore, the on-demand and MTO model is revolutionary not only for its sustainability aspects but also for its ability to enable customization and promote a customer-centric pull model. This approach empowers consumers by providing them with personalized products tailored to their preferences and needs, thus fostering a deeper connection between brands and customers. In the future, as the market matures and the on-demand model becomes more prevalent, its unique features, such as customization and the pull model, will become increasingly valuable in shaping the fashion industry and offering a more sustainable, customer-focused approach to production and consumption.

8.2. Limitations

The extent and dependability of my research were significantly impacted by two fundamental constraints, which I must acknowledge as the thesis's author. First of all, it was difficult to build a solid theoretical framework for my study due to the limited amount of research that is currently available on the on-demand business model. It was challenging to pinpoint essential ideas and research topics due to the lack of prior literature in the field, and it was also difficult for me to compare my findings to those of other studies. My study may not have been as thorough as I had intended as a result of this.

Second, I had a lot of trouble reaching MTO or on-demand brands to do interviews. I was able to contact over 70 people, but I was only able to interview three of them. Due to this restriction, the data I acquired for my study were considerably compromised, which resulted in a limited sample size and constrained the scope and generalizability of my findings. The validity and trustworthiness of my research may be impacted by the fact that the three interviews I was able to conduct may not have been representative of the industry as a whole.

8.3. Future Research

As the fashion industry strives to eliminate deadstock and shift towards on-demand models, there remain several areas for future research. For instance, future research could examine the on-demand model from different perspectives or approaches, considering a larger number of companies and their varied experiences.

One area of focus could be consumers' insights regarding the on-demand model, including their perception of convenience, cost, and sustainability. Furthermore, researchers could explore the on-demand technology market to better understand its maturity and how it can be leveraged to meet the needs of the fashion industry. Additionally, research could be conducted on current policies aimed at reducing deadstock and whether these policies will evolve in the future to combat the issue more effectively.

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Appendix

Appendix 1 – Primary and secondary data for Lectra, Benjamin Fox and Alohas

Lectra				
Primary data				
Type of data	Interviewee	Position	Date	
Interview	Katia Cahen	Marketing Intelligence Director	15/03	
Secondary data				
Type of data	Title	Author	Organization	Date
Website	https://www.lectra.com	-	-	-
Media Article	Lectra unveils fashion on demand digital solution for greater personalization	Apparel Resources News-Desk	Apparel Resources	18/12/2018

Benjamin Fox				
Primary data				
Type of data	Interviewee	Position	Date	
Interview	Ciara Louise	Founder	29/03	
Secondary data				
Type of data	Title	Author	Organization	Date
Website	https://www.benjaminfox.com.co	-	-	-

Media Article	The Rise Of Made To Order Fashion: Are Made To Order Brands Retail's Solution?	Daisy Murray	Elle UK	18/08/2020
Media Article	Why 'deadstock' dresses are this summer's hit eco buy	Caroline Leaper	Telegraph UK	19/08/2020
Media Article	The Rise of On-Demand Fashion Start-Ups, New Technology and Sustainability	Caroline Louise Hamar	Luxiders Magazine	<i>No date could be found</i>
Media Article	The soon-to-be cult fashion brands offering conscious-free shopping	Annabelle Spranklen	Glamour Magazine UK	28/09/2020

Alohas				
Primary data				
Type of data	Interviewee	Position	Date	
Interview	Paula Font	Production Manager	01/04	
Secondary data				
Type of data	Title	Author	Organization	Date
Website	https://www.alohas.io	-	-	-

Media Article	Alohas Introduces Eco-Friendly Alternatives, Morphs Into Sustainable Retailer	Rosa Sanchez	Forbes	01/07/2021
Media Article	Alohas, un modèle à la demande qui marche	Triana Alonso	Fashion Network	16/03/2021
Media Article	Swoon-worthy, sustainable shoes that are affordable and made to order	<i>No author could be found</i>	The Great Address	08/11/2021
Media Article	El modelo "bajo demanda" de Alohas o los zapatos por los que merece la pena esperar	Marina Valera	Glamour Magazine UK	04/03/2021

Affidavit

ESCP Europe

I, the undersigned, do hereby state that I have not plagiarised the paper enclosed and that I am the only author of all sentences within this text. Any sentence included which was written by another author was placed within quotation marks, with explicit indication of its source. I am aware that by contravening the stated ESCP Europe rules on plagiarism, I break the recognised academic principles and I expose myself to sanctions upon which the disciplinary committee will decide.

I also confirm this work has not previously been submitted during studies prior to ESCP Europe. If this work has been written during studies conducted in parallel to my time at ESCP Europe, I must state it.

I accept full responsibility for the content of this paper.

..... (Signature)

Laura Mendes Clero

..... (Print name)

08/05/2023

..... (Day/month/year)