Reducing Reverse Logistics and Return Rate of Online Fashion: A Six Sigma Approach towards

a More Sustainable and Green Supply Chain

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MBAR 661: Research Project

June 11, 2023

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1.0 Introduction

The fashion sector has grown rapidly in recent years, owing to the ease of internet purchasing and the availability of a wide range of products. However, this expansion has also brought about a rise in returns, which has a detrimental effect on the environment and the profitability of fashion stores. Sustainability and waste management concerns have been highlighted because of the high return rate in the online fashion retail industry. The industry's harmful environmental effects have also drawn attention, with climate change emerging as a critical issue. The sector has contributed to environmental degradation and depletion using non-renewable resources like oil, water, and raw materials. This study suggests using Six Sigma techniques to reduce return rates and reverse logistics in online fashion retail to address these problems. The study aims to present workable solutions that can assist fashion retailers in reducing waste, improving productivity, and developing a more sustainable supply chain.

1.1 Background

The fashion industry significantly influences the environment, especially in terms of trash production and carbon emissions. In addition, the growth of online fashion retail has increased returns, compounding the industry's already significant waste issue. The industry has started to investigate sustainable practices, such as the use of eco-friendly materials and circular economy programs, to address these problems. More effective solutions are still required to reduce waste and increase sustainability.

According to an article published in Forbes by Khusainova (2019), approximately 17 million items are being returned every year, and the number is only going up. This accounts for approximately 4.7 million metric tons of CO_2 emitted every year. Greenhouse gas emissions are also produced when goods are transported back and forth. Furthermore, only 54% of packaging is recycled overall. And it is estimated that every year, nearly 6 billion euros worth of returned goods wind up in landfills (*Returns on Online Purchases Are Not Free: They Come at a Cost for the Environment*, n.d.).

Six Sigma, a data-driven methodology focused on minimizing errors, reducing waste, and enhancing quality, is one strategy that has shown potential in several industries. Six Sigma has been effectively implemented in businesses, including manufacturing, healthcare, and banking, leading to improved productivity and cost reductions. Therefore, it makes sense to think about implementing Six Sigma in the fashion business to decrease waste and increase sustainability.

There has been limited research on implementing Six Sigma in the fashion business, particularly in online fashion retail. This study intends to explore how Six Sigma can be applied to reduce the rate of returns and reverse logistics to increase efficiency and sustainability in online fashion retail. The project will provide practical solutions to fashion retailers so they may cut waste, boost productivity, and build a more sustainable supply chain. By offering and creating a roadmap for using Six Sigma approaches, the study's ultimate objective is to persuade more businesses to embrace environmentally friendly practices that benefit both business and the environment.

1.2 Problem Statement and Research Questions

The increased growth in the e-commerce industry and ease of accessing the internet to purchase products online has brought a rise in the rate of returns, which negatively impacts the profitability of businesses and is detrimental to the environment. As stated by Norek (2002), returns management is an expansive burden for businesses and interferes with regular business operations. According to Hervani et al. (2005), Reverse logistics is essential for lowering waste and can be attained by various disposition alternatives. The existing literature talks about reverse logistics in terms of overproduction and recalling products, but studies on customer returns are limited. The proposed study intends to address the considerable environmental implications of reverse logistics and return rates in the online fashion retail sector. The research questions are formulated keeping in mind the existing research and gaps in the literature. The main research question is to find out how consumer behavior drives the rate of return. This includes the following.

1. What are the root causes of returns in the fashion e-commerce industry?

2. What are the relationships between perceived quality, impulse buying, and psychological factors on the rate of return?

1.3 Scope, Significance, and Limitations

According to Panigrahi et al. (2018), with the advent of globalization and fast fashion trends, the fashion retail industry is faced with the challenge of sustainability. The industry adopts reverse logistics practices to identify and classify returned products for proper disposition. Another study by Stalk (2006) states that customer returns are increasing significantly over time. Some categories of products are seeing more than a 50% return rate

from customers. This study aims to investigate how six sigma techniques can help lower the return rates in e-commerce fashion. The study also aims to investigate the reasons for returns and suggest and develop a roadmap to address these reasons to lower the rate of return. The study further investigates how green supply chain practices can be applied to reduce carbon emissions and persuade businesses to adopt environmentally friendly practices to reduce their carbon footprints.

The research will be focused on assessing the literature on Six Sigma's principles and practical applications in the fashion sector. The study will examine the current state of reverse logistics, return rates, and their effects on the environment and supply chain effectiveness in online fashion retail. The study will also explore the fundamental reasons for returns in the online fashion industry by using existing and collecting data from participants.

The research will take a quantitative approach to collect and use existing data from e-commerce shoppers. The study's findings will aid fashion retailers to develop strategies to reduce return rates and reverse logistics while maintaining sustainability and operational effectiveness.

The study aiming to aid fashion retailers in reducing the rate of return and optimize the supply chain practices that could potentially lead to more profitability and reduce the carbon footprint of the business comes with several limitations that need to be acknowledged. The primary data collected for the study uses convenience sampling, which means data was collected from participants based on their availability and accessibility. This sampling technique was used due to budget and time constraints. The non-probability sampling technique used for the research may have introduced bias and limit the generalization of the findings. The sample

size of the participants and recorded responses were relatively small, which may affect the statistical power and limit the representativeness of the results. The research findings cannot draw definitive conclusions, and further study may be required to validate and complement the current findings, and any conclusions should be taken as indicative rather definitive.

1.4 Objectives and Contributions to Knowledge

The study aims to provide a roadmap for businesses to improve the return rate for online channels using six sigma techniques. The study's objective is to address pressing issues faced by the online fashion industry, namely the rising rate of returns and its impact on the environment and profitability of businesses. The study aims to advance the knowledge in the field of fashion and sustainability by contributing to the development of practical solutions and practices to mitigate the challenge of reverse logistics and promote sustainability in the fashion sector.

The research will contribute to the existing literature on the use of six sigma techniques, specifically in the context of the online fashion retail industry. It will help fill a knowledge gap in the existing body of knowledge by investigating the effectiveness and feasibility of using Six Sigma to address the high return rates and environmental concerns. The study will strategize solutions for fashion retailers, and these solutions will benefit the businesses and the environment by lowering waste, enhancing productivity, promoting sustainable practices, and addressing the concerns surrounding the industry's harmful effects on the environment and climate change.

2.0 Literature Review

2.1 E-commerce Fashion Industry

Electronic commerce, or E-commerce, refers to the buying and selling products and services through computer networks, specifically the internet. It has revolutionized how businesses operate by providing cheaper and more efficient distribution channels for their offerings, enabling them to reach a broader market. E-commerce has made almost every product and service available online, including books, music, clothing, electronics, travel tickets, and financial services such as online banking and stock investing. It is a highly disruptive technology and can be conducted in four ways: Business to Business (B2B), Business to Customer (B2C), Customer to Customer (C2C), and Customer to Business (C2B). E-commerce has grown rapidly over the years, with online retail sales expected to reach $27 trillion by 2020. This growth rate is estimated to be around 23% per year, making it one of the fastest-growing industries in the global economy. India is the third-largest e-commerce economy in the world, after China and the USA. It is predicted that by the end of 2021, 82 crore people in India will be using the internet, with 40% of this usage directed toward online purchases (Sharma, 2020).

Guercini et al. (2018) discussed the emergence of a "new" form of marketing in the fashion industry because of the development of digitalization and e-commerce. The development of online sales in the fashion industry is dependent on societal and technological advancements (Pezderka & Sinkovics, 2011; Reynolds, 2002). The online environment is particularly important for e-commerce businesses, as it allows for expansion on a global scale (Reynolds, 2002). The authors suggest that the evolution of e-commerce in the fashion industry is driven by changing technologies, consumer behaviors, and the responses of fashion

companies, especially regarding their marketing activities. The US department store crisis has

been linked to a significant development in recent years regarding the electronic trade of

fashion goods. The competition between traditional and digital retail channels is one theory for

this crisis (Barrabi, 2017). Despite the importance of physical stores, fashion companies have

witnessed the development of a new form of online marketing (Blázquez, 2014). The authors

emphasize the importance of internationalization in e-commerce within the fashion industry, as

the use of the Internet and online channels is perceived as a powerful tool in this process

(Guercini et al., 2018).

2.2 Fashion Industry During the Pandemic

The SARS-CoV-2 virus pandemic has caused a global shock that has led to significant and

long-term effects on both the micro and macro scale, including the creative industries such as

the fashion and design sectors. The pandemic has resulted in challenges for businesses to

maintain production, employment, financial liquidity, intellectual property rights, and adapt to

the e-commerce world (Bilińska-Reformat & Dewalska-Opitek, 2021). This has led to new

opportunities and challenges in the business ecosystem, particularly in the fast fashion industry,

where consumer demand for design and business thirst for profit has driven the industry for

generations.

The objective of this paper is to identify the changes in business models implemented by

fast fashion retailers during the pandemic, with a focus on Inditex. Prior to the pandemic, many

retailers focused on brick-and-mortar channels. However, the growth of e-commerce during

COVID-19 has motivated retailers to invest more heavily in their online channels, including

Inditex (Chaudhari, 2020). The occurrence of a global pandemic has posed an enormous

challenge to world economies, and enterprises are seeking efficient ways to function in the

market. Rebuilding various economic areas may take several weeks or months (Raport CSR,

2020).

The fashion industry faced a significant challenge during the global pandemic 2020, with

changes in consumer habits and supply chain disruptions leading to a sharp decline in economic

profit. McKinsey & Company's report, "The State of Fashion" (2020), revealed that the

economic profit of fashion industry companies decreased by as much as 90% in 2020, compared

to a 4% increase in the previous year. The report also presented two possible scenarios for the

sector's sales in 2020: a moderate decline of 0-5% compared to 2019 with a return to pre-

pandemic activity levels by Q3 2022, or a more significant decline of 10-15% with a return to

pre-pandemic levels only in Q4 2023.

PwC's report, "Polish fashion sector on the brink" (2020), predicted three possible

scenarios for the industry in Poland. In the most optimistic scenario, the fashion sector would

experience a moderate recession, resulting in a cash gap of PLN 10.9 billion. In the second

scenario, the industry would require external support of PLN 16.1 billion to maintain financial

liquidity and avoid collapse, with PLN 1.1 billion of support available under the anti-crisis shield.

In the most pessimistic scenario, the industry would need over PLN 32 billion in addition to the

PLN 2.3 billion received in government support.

The pandemic has also led to changes in consumer behavior, with online commerce

becoming increasingly important. As a result, fashion companies are shifting their focus

towards strengthening customer engagement through brand relationships and social media,

with the role of personalized consumer communication expected to increase. McKinsey's report

suggests that companies must strengthen their digital divisions to offset the decline in revenues from brick-and-mortar sales. For example, CCC Group's financial results in Q4 2020 showed a 2% increase in revenue, with e-commerce sales accounting for 52% of total revenues compared to less than 29% the previous year.

2.3 Reverse Logistics

Reverse Logistics (RL) is the term used to describe the movement of goods or materials against the flow of the conventional supply chain to add value, recover value, or ensure the correct disposal of the goods or materials. The planning, implementation, and control of the flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption back to the point of origin are all part of this process, according to Rogers and Tibben-Lembke (1999). This is done in a way that is both economical and effective. The final objective is to ensure that the returned goods are disposed of appropriately or to recover or add value to them. Reverse logistics includes processes like product returns from consumers, extra inventory at stores; product recalls, etc. (Venkatesh,2010). According to Norek (2002), returns management is typically disregarded in supply chain management and is frequently viewed as an expensive burden that interferes with regular business operations. Reverse logistics, on the other hand, need to be viewed as a potential to acquire a competitive advantage, cut expenses, and raise customer satisfaction. Reverse logistics can even generate profits for a business by implementing an efficient return handling system (Andel, 1997). Return logistics is usually delegated to the customer service function within the organization, where customers with dissatisfied product quality return their products to the supplier for exchange or refund. RL is critical in e-commerce as the buyer needs to be sure that they can return the

product in case of damage, defect, or any dissatisfaction with the product for a refund (Meade

et al., 2007).

2.4 Impact of Reverse Logistics on Sustainability

Sustainability has evolved as a fundamental strategic target for almost all firms in the

twenty-first century, owing to its potential to increase profitability, promote expansion, and

even secure survival (Corbett & Klassen, 2006; Kolk & Pinkse, 2008). Since the adoption of

"green" business practices and the recognition of corporate social responsibility by businesses,

sustainability has received a great deal of attention within the field of supply chain

management. This focus is also spurred by the necessity of adhering to laws designed to

minimize environmental damage as well as the realities of the challenging market and

economic competition (Agrawal et al., 2016). Organizations can boost their earnings and assure

long-term sustainability by using sustainability principles (Székely & Knirsch, 2005). Therefore,

organizations regard the development of practices that enhance sustainability as a critical goal,

given their potential to provide competitive advantage (Hart, 2005; Pfeffer, 2010). A logistics

function called reverse logistics (RL) is dedicated to controlling the movement of goods

backward from customers to suppliers (Hazen, 2011). When it comes to green supply chain

management (GSCM), RL is essential for lowering waste produced during the processing and

disposal of returned and used goods. This goal can be attained by using a variety of disposition

alternatives (Hervani et al., 2005; Pokharel & Mutha, 2009). At many stages of the supply chain,

including manufacture, distribution, and customer-related returns, products might be returned

for a variety of reasons (Rogers & Tibben-Lembke, 1999; Flapper, 2003). A key component of RL

is the process of "product disposition," which entails several actions related to selecting what to

do with worn or returned goods (Prahinski & Kocabasoglu, 2006). Various disposal alternatives, including reuse, repair, remanufacturing, recycling, and disposal, have been recognized as typical activities within RL (Thierry et al., 1995; De Brito & Dekker, 2002; Pokharel & Mutha, 2009). Reverse logistics (RL) is a crucial strategy within green supply chain management (GSCM). Together with other GSCM techniques, RL's effects on various sustainability and performance outcomes have been studied by several experts (Banihashemi et al., 2019).

Reverse logistics is receiving increasing attention from businesses nowadays because of their social responsibility and increased customer expectations. Companies are demonstrating their commitment to sustainability by utilizing a green image and branding as their primary marketing strategies. Due to merchants' customary adoption of a lax return policy, the volume of returned goods is rising. Due to this, businesses now place a higher priority on efficient return procedures, including product recall, maintenance, and repair. Reverse logistics done right can lower business inventory and distribution expenses while increasing customer satisfaction. Moreover, by recouping value from the returned goods, it can benefit a business's bottom line (Lee & Lam, 2012).

2.5 Reverse Logistics and Returns Management In the Fashion Industry

The retail industry faces the challenge of sustainability, especially with the advent of globalization and fast fashion trends. To address the issue of returns, the industry has adopted reverse logistics practices aimed at correctly identifying and categorizing returned products for appropriate disposition. However, recent recalls of products due to safety hazards have further highlighted the importance of efficient reverse logistics practices. While less than 20% of retail returns are due to defects, the remaining returns fall into various categories, such as end-of-life

products, season returns, and disposal. Managing recalled products is crucial for retail industry

profitability, as it carries a potential liability for the company. Reverse logistics involves a

different flow from forward logistics, with customers returning products to the original sender

for a refund, posing a financial risk for the seller. This is particularly relevant for products with a

high risk of obsolescence due to seasonality. Retail returns also indicate a lack of market

demand, which has become more pronounced with the concentration of market power in the

form of retail chains (Panigrahi et al., 2018).

The return of articles is a crucial aspect of the retail industry, whereby customers return

items that they find unsatisfactory for various reasons and receive a full or partial refund under

the retailer's return policy. In recent years, the volume of customer returns has increased

significantly, with specific categories experiencing up to a 50% year-over-year increase (Stalk,

2006). Online fashion apparel has the highest return rates, with an overall return rate of 25-

40%, reaching as high as 75% for specific categories and brands. The primary reason for this is

that fashion apparel is complex, involving many factors such as size, fit, color, style, taste, and

unquantifiable elements such as personal preferences. Poor size and fit are the most cited

reasons for online fashion returns. On one hand, customers rely on a physical examination of

fashion items to make informed purchase decisions, considering factors such as size, fabric,

design, and how they will pair with other clothing items. On the other hand, when shopping for

fashion items online, customers are unable to try them on and assess their sensory and visual

feedback until they receive them, which can result in uncertainty and make it challenging to

return items.

Consequently, many customers may hesitate to place an order, or they may employ strategies

such as ordering multiple sizes or colors of the same item and then returning those that do not

meet their criteria, especially for fashion brands and categories with which they are unfamiliar.

For online fashion merchants, the issue of size and fit is not just a top priority, but it also

significantly affects the environment and their bottom line. The significant carbon footprint

produced during the reverse logistics is a primary sustainability concern related to returns.

Online fashion merchants have introduced lax return policies to reduce customer confusion and

promote more purchases, which has increased returns. Online fashion businesses must adapt

and create cutting-edge tactics to effectively minimize the high rate of returns caused by the

size and fit difficulties as consumers become more concerned with fit and sustainability (Nestler

et al., 2021).

2.6 Sustainability in Fashion Industry

Climate change and other environmental crises have highlighted how crucial it is for

corporations to acknowledge their essential involvement in causing these problems. Recently,

there has been increased discussion about how businesses must develop practical plans to

lessen the pollution they produce and use natural resources wisely. The fashion industry has

primarily faced criticism for its unsustainable business practices and for adding to the waste

problem. The industry is in charge of controlling how long clothes last, with items being

discarded due to marketing strategies that support new fashion trends rather than because

they are out-of-date or worn out. The fashion industry's unsustainable practices and ongoing

growth have serious negative environmental effects (Thorisdottir & Johannsdottir, 2019). The

business is worth approximately $3 trillion and contributes approximately two percent of the global GDP (Global Fashion Industry Statistics, n.d.).

For the fashion business, particularly for fast fashion and disposable apparel, sustainability has emerged as a crucial problem. Some well-known fast fashion companies, like H&M, have started sustainable initiatives to address this issue. H&M is regarded as a pioneer in sustainable fast fashion since it creates the "Conscious Collection," a range of eco-friendly and recycled fabrics, promotes clothing recycling through glitzy advertising campaigns, and gives discounts to customers who donate their used clothing to its stores. Although some detractors have questioned the efficacy of H&M's sustainability initiatives in reducing environmental damage brought on by its fast fashion business, the company's investment in eco-friendly programs shows its dedication to sustainability (Liu et al., 2017).

2.7 Sustainable and Green Supply Chain Practices

It is challenging to measure or assess sustainability because it differs depending on the type of business, the manufacturing processes, the distribution flows, the environment, the participants, and the type of leadership. It's also challenging because the financial objectives clash with the environmental objectives of minimizing harm and the social objectives of maximizing social well-being. Additionally, organizations are pressured to convince stakeholders of the value of sustainability programs and outcomes because financial incentives like lower costs and increased efficiency only sometimes become apparent when businesses pursue sustainability goals (Ali et al., 2019). With challenges like assessing and measuring sustainability and growing market demand for various products in the latter half of the twentieth century, many organizations found inexpensively profitable modes of production and

frequently jeopardized long-term effects on the environment. However, society has changed in recent years, leading to the implementation of stricter laws for environmental protection in most developed nations (Rajeev et al., 2017). Vachon and Klassen (2006) proposed the idea of "green supply chain practices," which consists of two groups of related but separate environmental activities: environmental collaboration and environmental monitoring. As a result, an organization's green supply chain practices suggest either (i) internalizing by integrating its environmental management activities with those of other organizations in the supply chain or (ii) externalizing environmental management in the supply chain by using market-based mechanisms. Environmental collaboration is the planning and development of environmental activities and projects that call for an organization's direct involvement, whether with its suppliers or customers, to jointly develop environmental solutions. Environmental collaboration calls for an organization to devote resources to cooperative activities to address environmental problems in the supply chain. By taking these steps, supply chain participants can potentially capture the added value of cooperating to reduce environmental impact. The environmental collaboration focuses less on the immediate results of the suppliers' environmental efforts (e.g., compliance with existing regulations) and more on the process by which more environmentally sound operations or products might be achieved. Environmental monitoring refers to supply-chain environmental activities with characteristics of market-based or arm's-length transactions. It typically entails investigating a supplier's environmental practices through publicly available environmental records, questions, and audits carried out by the buyer or a neutral third party. A supplier requirement for adherence to a "voluntary" (i.e., non-governmental) code of practice or public standard can also be used as an example of

environmental monitoring (Vachon, 2007). Some companies in the American apparel sector,

such as Levi-Strauss, Nike, Gap, and Eddie Bauer, created their own environmental compliance

standards and conducted audits to assess their suppliers' compliance levels (Lo et al., 2012).

The globalization of sourcing and distribution has been one of the most significant factors

promoting the rise of sustainable practices in fast fashion supply chains. In addition to the

effects of globalization, the nature of the industry itself imposes additional social and

environmental costs. Environmentally harmful chemicals and non-renewable natural resources

are used during textile industry production (Turker & Altuntaş, 2014). According to De Brito et

al. (2008), some fast-fashion retailers are attempting to adopt and improve sustainability

through tools like eco-labeling, management systems, environmental and social audits,

communities of practice, fair trade, and clean transportation methods.

2.8 Six Sigma Approach to Quality and Process Improvement

Quality refers to conformance to specifications (Gilmore, 1974; Levitt, 1972) and

requirements (Crosby, 1979). The goal of quality is to identify nonconformity situations that

exist in production processes and take corrective action. Using quality tools during the

development phases of small to large projects, continuous improvement, and the problem-

solving approach known as Define, Measure, Analyze, Improve, and Control (DMAIC), Six Sigma,

a disciplined methodology, can be applied in an organized way. The goal of Six Sigma is to

improve a company's performance and productivity. It prioritizes customer satisfaction. Work

towards ongoing process and quality improvement to achieve this satisfaction. Six Sigma

adheres to statistics with discipline (Da Silva Gomes et al., 2022). Six Sigma is a structured,

project-focused, statistically-based method for lowering variability, removing flaws, and

eliminating waste from goods, processes, and transactions. DMAIC (Define-Measure-Analyze-Improve-Control) and DFSS (Design for Six Sigma) are the two main approaches in Six Sigma. DMAIC is frequently employed to enhance current processes. Project management and financial analysis are also included in this methodology. For new processes, the DFSS approach is utilized (Gijo & Scaria, 2014).

2.9 Six Sigma Methodologies for Supply Chain Management and Quality Improvement

According to Knowles et al. (2005), the well-established lean six sigma approach in supply chain management significantly positively impacts supply chain performance by reducing waste levels. Any organization that has inefficient and ineffective business processes in a highly competitive market incurs opportunity costs. Organizations have started investing in process improvement methodologies like Total Quality Management (TQM), reengineering, benchmarking, Lean, Six Sigma, and Lean Six Sigma, among others, to combat these inefficiencies and improve service quality. The lifeblood of an organization is its supply chain, which serves as an integrated function. Supply chains can improve their effectiveness and efficiency by implementing Lean Six Sigma (LSS). Simplified supply chain management (SCM) can boost business performance by giving customers more for their money. SCM promotes integration between businesses and their suppliers by creating supplier partnerships and strategic alliances, which increases organizational effectiveness and profitability (Madhani, 2020). Lean SCM, as defined by Vitasek et al. (2005), is a collection of organizations that are directly connected by upstream and downstream flows of goods, services, information, and funds and who cooperate to cut costs and waste by efficiently pulling what is required to satisfy customers' needs. A lean supply chain aims to make sure value is transferred downstream as

effectively and efficiently as possible. A lean supply chain must be in place to reduce lead times and identify all forms of waste in the supply chain's value stream (Abdulmalek & Rajgopal, 2007).

2.10 Factors Affecting Product Returns in Online Fashion Shopping

In a short time, customer expectations, norms, and behavior have changed significantly (Robertson et al., 2020). Their enjoyment and sense of control significantly influence a new customer's intention to return. However, almost all returning customers developed into devoted ones. This has significant consequences in the highly competitive world of online commerce. Considering rising customer acquisition costs, companies need to find the ideal combination of design and functionality to boost new customer retention and loyalty (Koufaris et al., 2001). Product returns are significantly more likely when fewer reviews are available at the purchase time (Sahoo et al., 2018).

3.0 Research Methodology

The research methodology for this study involves a systematic approach to collecting and analyze data. The primary research method used was a questionnaire survey administered to participants to collect data on their online buying habits and reasons for returns. The survey was designed with closed-ended questions and based on tried-and-true variable scales published in prestigious journals and received numerous citations. The Likert scale, a popular tool for gauging attitudes and opinions, was used to gather data. An online sample of consumers who shop for fashion online will receive the survey. The data was then analyzed using statistical software to test the model's premise and gauge the critical variables. Using

tried-and-true techniques for questionnaire design and analysis ensured the validity and reliability of the research.

3.1 Research Approach and Strategy

The growth of e-commerce in the recent past, especially after the pandemic, has made it very easy for consumers to shop at the ease of their homes. This has also led to an increase in a high rate of returns. In today's time, almost all brands offer free returns with no questions being asked. A customer can simply return a product with the same ease as the order-placing process. This higher rate of returns costs these businesses a fair share of money and impacts the environment. The research aims to suggest and develop a roadmap to reduce return rates and reverse logistics in the fashion e-commerce industry using six sigma tools. A questionnaire was designed and involved a systematic approach to collecting quantitative data using closed-ended questions. In United States alone there were 268 million online shoppers, and the number is anticipated to increase to nearly 285 million by 2025 (Taheer, 2023). A total of 155 respondents answered the questionnaire. Among the respondents, 49 people fell within the age range of 19-24, followed by the majority of 75 individuals in the 25-30 age group. There were 23 respondents between the ages of 31 and 35, while 4 respondents were aged 36-40, and 6 participants belonged to the 40+ age group.

3.2 Data Collection Methods and Sampling Techniques

Selecting the proper data collection methods are extremely important, and these methods should align with the research objectives. Data should provide explicit answers to the research questions. A closed-ended questionnaire was designed to conduct a survey and collect data from the participants. The questionnaire consisted of 15 questions, with all questions

being answered on a 5-point Likert scale. Questions were designed to understand the participants' demographics, consumer behavior, cognitive dissonance, and return intention. Due to time and resource constraints, a convenience sampling technique was used, and participants were selected based on accessibility and willingness to participate. The number of participants does not represent a sufficient statistically determined sample size and may cause a potential bias and lack of representativeness. This has been addressed and acknowledged as one of the study's limitations.

The questionnaire began with the appropriate consent form, and participants provided informed consent before participating. The consent form indicated privacy and confidentiality information, and participant identity was kept anonymous by not asking any identifier questions.

It is essential to recognize that a limited sample size is employed for this study. Due to time and resource limitations, convenience sampling was used, which can lead to potential bias and may not reflect the diversity of the population under investigation. These constraints should be considered when interpreting the study's outcomes. Given these constraints and limitations, extreme caution should be exercised while drawing any definitive conclusions from the findings. Further study may be required to validate and complement the current findings, and any conclusions should be taken as indicative rather than definitive.

3.3 Questionnaire Design and Validation

In e-commerce fashion, returns have emerged as a common and significant challenge for online retailers. Investigating the underlying causes of e-commerce fashion returns is imperative to mitigate this issue. To gain a deeper understanding of this phenomenon, it is

necessary to develop a well-structured questionnaire that can effectively capture relevant

demographic data, such as gender, age, lifestyle, and background, of consumers who return

products. The questionnaire should also delve into the shopping habits of these customers,

including how frequently they shop, what motivates them to buy things, and why they return

them. Investigating how return policies affect consumer purchasing behavior is also crucial. A

thorough understanding of the elements influencing e-commerce fashion returns can be

attained by gathering primary data using a well-designed questionnaire. This can then help with

the creation of efficient plans to lower returns and raise customer satisfaction. In accordance

with Lv and Liu's (2022) research, the questionnaire utilizes a Likert scale to gauge consumer

behavior. The questionnaire is provided in the appendix section.

The current study will take reference from the already peer reviewed questionnaire to

develop a questionnaire to gather primary data that will help in analyzing and understanding

what drives consumers to return the fashion products purchased online. The current study

would need the following questions for the questionnaire.

Table 1

Questionnaire for Primary Data collection

	Question	**Response**
Demographic	Age	The scale of 5 Years gap
	I often plan ahead before I go online to shop	Likert 5-point scale (strongly disagree to strongly agree)
	How often do you buy fashion products online? (Includes clothes, accessories)	Weeks to months scale
Consumer Behavior	I spend more than my budget on online shopping	Likert 5-point scale (strongly disagree to strongly agree)

		Likert 5-point scale (strongly
	I sometimes buy things on impulse	disagree to strongly agree)
	After receiving the product, I sometimes find that there is a gap between the product and my expectations.	Likert 5-point scale (strongly disagree to strongly agree)
Cognitive Dissonance	After receiving the product, I sometimes doubt whether I made the right purchase decision.	Likert 5-point scale (strongly disagree to strongly agree)
	After receiving the product, I wondered if I really needed it.	Likert 5-point scale (strongly disagree to strongly agree)
	The quality of the product is not up to my expectations	Likert 5-point scale (Never to Very often)
	The color of the product varies to what it was shown online.	Likert 5-point scale (Never to Very often)
	The fit of the product is not appropriate	Likert 5-point scale (Never to Very often)
Product Dissonance	I did not like it on me, or it didn't suit me	Likert 5-point scale (Never to Very often)
	I only return to deal with inappropriate products purchased online	Likert 5-point scale (strongly disagree to strongly agree)
Return Intention	I purchase only from brands that have easy return policies	Likert 5-point scale (strongly disagree to strongly agree)
	How often do you return a product purchased online?	Likert 5-point scale (Always to Never)

Note. Questionnaire created by author using current literature for primary data collection.

3.4 Data Analysis Techniques and Softwares

In this study, various data analysis techniques were used to gain insight from the collected data. The following techniques were employed to explore and interpret the dataset.

Descriptive Statistics*:* Descriptive statistical analysis was used to summarize and describe the main features of the dataset. This involved calculating measures of central tendency (such as mean, median, and mode) and measures of dispersion (such as standard deviation and range). Additionally, graphical representations such as density plots were used to visualize the distribution of variables.

Cluster Analysis: In order to find patterns and groupings within the dataset, cluster analysis was used. Using this method, we were able to group participants according to their age into distinct segments or clusters within the sample based on how they responded to various variables.

Correlation Analysis: The relationships between variables in the dataset were conducted using correlation analysis. By calculating the correlation coefficients, we were able to evaluate the strength and direction of associations between various variables. This analysis helped us understand the interdependencies and potential connections among the studied factors.

Hypothesis Testing: To determine the statistical significance of relationships and differences in the data, hypothesis testing was used. Specifically, t-tests assuming equal variances were conducted to test hypotheses regarding mean differences between groups or the association between variables of interest.

To perform these analyses, statistical software was utilized. Microsoft Excel was employed for data cleaning, sorting, and conducting statistical analyses. Microsoft Excel and Tableau were employed for visualization of results.

2.5 Limitations of the Research

The goal of the study is to help fashion retailers improve profitability and lower their carbon footprint by lowering return rates and streamlining supply chain procedures. However, it's critical to recognize a few research-related limitations. The use of convenience sampling for data collection, which depended on participants who were easily accessible and available, is one limitation. Budget and time constraints led to the selection of this sampling method, which may introduce bias and prevent the findings from being generalized. Additionally, the sample size of participants and recorded responses was quite small, which could have had an impact on statistical power and restricted the results' representativeness. Therefore, it is crucial to interpret the results with caution and acknowledge that additional research is required to confirm and expand upon the current findings. The conclusions drawn from this research should be considered as indicative rather than definitive. By addressing these limitations and conducting more extensive research, a more comprehensive understanding can be gained to support the development of effective strategies for reducing return rates and promoting sustainability in the fashion industry.

4.0 Results and Findings

A total of 155 responses were recorded from the participants. 27.1% of the respondents don't plan before doing online shopping, and 23.9% of the respondents spend more than their budget on online shopping. 66.4% of the respondents find a gap between the product and their

expectations from the product after receiving it. The quality, fit, and color of the product also do not meet the expectations of the respondents in almost 40% of the cases.

Figure 1
Responses of how often people plan before they shop online
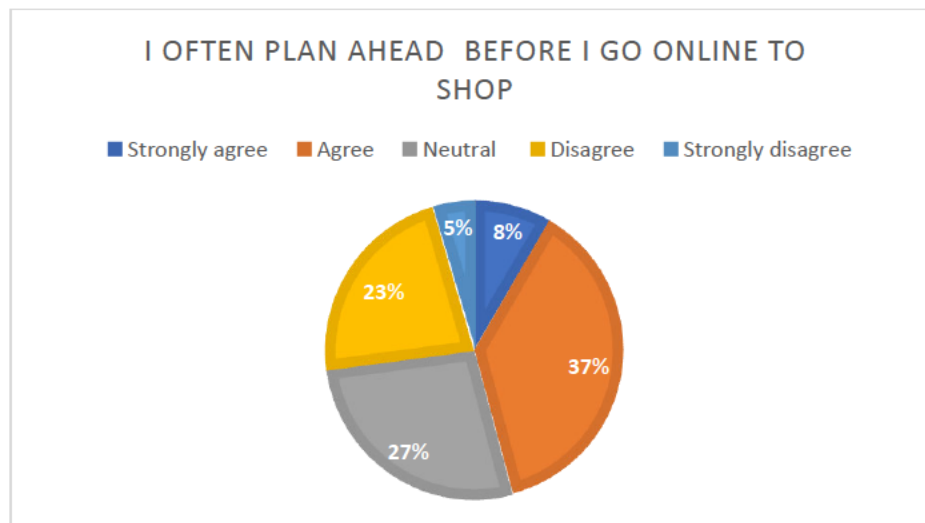
Note. From primary data collection, a chart was created by the author using *Microsoft Excel.*

This shows that a large number of respondents do not plan ahead before they shop online, which may increase impulse buying behavior.

Figure 2

Responses of how many respondents spend more than their budget

I SPEND MORE THAN MY BUDGET ON ONLINE SHOPPING

■ Strongly agree ■ Agree ■ Neutral ■ Disagree ■ Strongly disagree
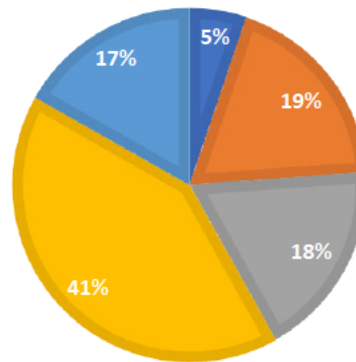
Note. From primary data collection, a chart was created by the author using *Microsoft Excel.*

4.1 Descriptive statistics and sample characteristics

The mean, median, and mode of all the responses are analyzed to understand the average

response of the respondents. The standard deviation reflects the dispersion of responses

around the mean. Variance reflects the measure of the spread of responses within the sample.

The descriptive statistical analysis of each response is given below.

Table 2

Descriptive statistics for respondents who plan before online shopping

I often plan ahead before I go online to shop	
Mean	3.225806452
Standard Error	0.083165477
Median	3
Mode	4
Standard Deviation	1.035401842
Sample Variance	1.072056975

Kurtosis	-0.706117326
Skewness	-0.252609984
Range	4
Minimum	1
Maximum	5
Sum	500
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.164292407

Table 3

Descriptive statistics for frequency of purchase by respondents

How often do you buy fashion products online? (Includes clothes, accessories)	
Mean	4.025806
Standard Error	0.126487
Median	4
Mode	4
Standard Deviation	1.574754
Sample Variance	2.479849
Kurtosis	-0.18209
Skewness	0.452183
Range	6
Minimum	1
Maximum	7
Sum	624
Count	155
Largest(1)	7
Smallest(1)	1
Confidence Level(95.0%)	0.249874

Table 4

Descriptive statistics for respondents who spend more than their budget

I spend more than my budget on online shopping	
Mean	3.458065
Standard Error	0.090726
Median	4
Mode	4
Standard Deviation	1.129525
Sample Variance	1.275827
Kurtosis	-0.66668
Skewness	-0.4834
Range	4
Minimum	1
Maximum	5
Sum	536
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.179227

Table 5

Descriptive statistics for respondents who buy things on impulse

I sometimes buy things on impulse	
Mean	2.95483871
Standard Error	0.085054967
Median	3
Mode	2
Standard Deviation	1.058925794
Sample Variance	1.121323837
Kurtosis	-0.895759993
Skewness	0.124156038
Range	4
Minimum	1

Maximum	5
Sum	458
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.168025071

Table 6

Descriptive statistics for respondents who find gaps in products

After receiving the product, I sometimes find that there is a gap between the product and my expectations.	
Mean	2.309677419
Standard Error	0.067617137
Median	2
Mode	2
Standard Deviation	0.84182657
Sample Variance	0.708671973
Kurtosis	-0.246077606
Skewness	0.485252298
Range	3
Minimum	1
Maximum	4
Sum	358
Count	155
Largest(1)	4
Smallest(1)	1
Confidence Level(95.0%)	0.133576847

Table 7

Descriptive statistics for respondents who doubt whether they have made the right decision or

not

After receiving the product, I sometimes doubt whether I made the right purchase decision.	
Mean	2.729032
Standard Error	0.085039
Median	3
Mode	2
Standard Deviation	1.058728
Sample Variance	1.120905
Kurtosis	-0.72452
Skewness	0.262788
Range	4
Minimum	1
Maximum	5
Sum	423
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.167994

Table 8

Descriptive statistics for respondents who wonder whether they needed the product

After receiving the product, I wondered if I really needed it.	
Mean	3.141935484
Standard Error	0.089423377
Median	3
Mode	4
Standard Deviation	1.113312069

Sample Variance	1.239463762
Kurtosis	-1.02915725
Skewness	-0.227493823
Range	4
Minimum	1
Maximum	5
Sum	487
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.176654814

Table 9

Descriptive statistics for respondents who find the product up to their expectations

The quality of the product is up to my expectations	
Mean	3.464516129
Standard Error	0.06226921
Median	3
Mode	4
Standard Deviation	0.77524541
Sample Variance	0.601005446
Kurtosis	-0.385275121
Skewness	-0.091991399
Range	3
Minimum	2
Maximum	5
Sum	537
Count	155
Largest(1)	5
Smallest(1)	2
Confidence Level(95.0%)	0.12301208

Table 10

Descriptive statistics for respondents who find color variation in product

The color of the product varies to what it was shown online.	
Mean	2.896774
Standard Error	0.066748
Median	3
Mode	3
Standard Deviation	0.831008
Sample Variance	0.690574
Kurtosis	0.101852
Skewness	0.05851
Range	4
Minimum	1
Maximum	5
Sum	449
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.13186

Table 11

Descriptive statistics for respondents who find fit to be appropriate

The fit of the product is appropriate	
Mean	3.445161
Standard Error	0.056531
Median	4
Mode	4
Standard Deviation	0.703811
Sample Variance	0.49535
Kurtosis	0.271328
Skewness	-0.5387
Range	4
Minimum	1
Maximum	5
Sum	534
Count	155

Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.111677

Table 12

Descriptive statistics for respondents who find a product to be appropriate for them

I did not like it on me, or it didn't suit me	
Mean	3.258064516
Standard Error	0.060606286
Median	3
Mode	3
Standard Deviation	0.754542174
Sample Variance	0.569333892
Kurtosis	0.378103433
Skewness	-0.100197788
Range	4
Minimum	1
Maximum	5
Sum	505
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.119726994

Table 13

Descriptive statistics for respondents who deal with inappropriate products purchased online

I only return to deal with inappropriate products purchased online	
Mean	2.55483871
Standard Error	0.080395928
Median	2
Mode	2

Standard Deviation	1.000921235
Sample Variance	1.001843318
Kurtosis	-0.335707354
Skewness	0.358958402
Range	4
Minimum	1
Maximum	5
Sum	396
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.158821196

Table 14

Descriptive statistics for respondents who buy from brands that have easy return policies

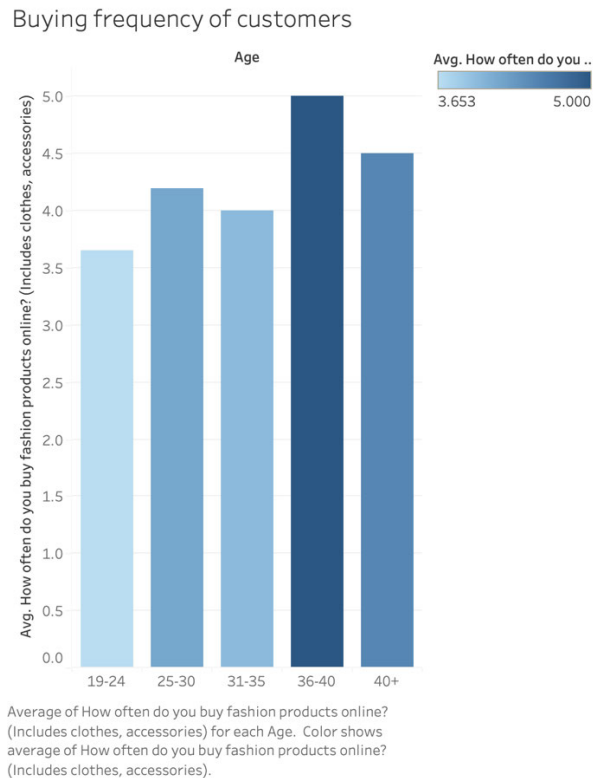| *I purchase only from brands that have easy return policies*	
Mean	2.380645
Standard Error	0.087449
Median	2
Mode	2
Standard Deviation	1.088732
Sample Variance	1.185337
Kurtosis	-0.52795
Skewness	0.509751
Range	4
Minimum	1
Maximum	5
Sum	369
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.172755

Table 15

Descriptive statistics for how often the respondents return a product purchased online

How often do you return a product purchased online?	
Mean	3.503226
Standard Error	0.066874
Median	4
Mode	4
Standard Deviation	0.832569
Sample Variance	0.693171
Kurtosis	0.483818
Skewness	-0.42071
Range	4
Minimum	1
Maximum	5
Sum	543
Count	155
Largest(1)	5
Smallest(1)	1
Confidence Level(95.0%)	0.132108

The negative kurtosis value indicates that the distribution is slightly less peaked compared to a normal distribution. The bell curve is flatter and has lighter tails than normal distribution.

The buying frequency of the customers in figure 3 is studied by taking the average of their respective views according to the age group they fall into. This analysis plays a significant role in determining the overall buying behavior of consumers in different age groups, which becomes the ultimate foundation for this research analysis.

Figure 3

Buying Frequency of Respondents

Buying frequency of customers

Average of How often do you buy fashion products online?
(Includes clothes, accessories) for each Age. Color shows
average of How often do you buy fashion products online?
(Includes clothes, accessories).

Note. From primary data collection, a chart created by the author using *Tableau*

The outcome of this analysis is that the age group 19 to 24 has an overall return

behavior of 3(Sometimes), followed by the age group 25 to 30 with a return behavior of

3(Sometimes), age group 31 to 35 with a return behavior of 4 (Rarely), age group 36 to 40 with

a return behavior of 4 (Rarely) and age group 40 plus with return behavior of again 4. This

shows that, on average, people tend to rarely or sometimes return the product that they buy

online. This indicates that maximum purchases are being made by the age group of 19-24.

4.2 Density Plot Analysis

For analyzing the return behavior of the customers, we have performed a density

analysis in figure 4, taking the mean of return behavior for the different age groups of

customers. In this analysis, we have seen how the density is concentrated more on the mean of the return behavior shown by the customers in different age groups.

Figure 4

Buying Frequency of Respondents
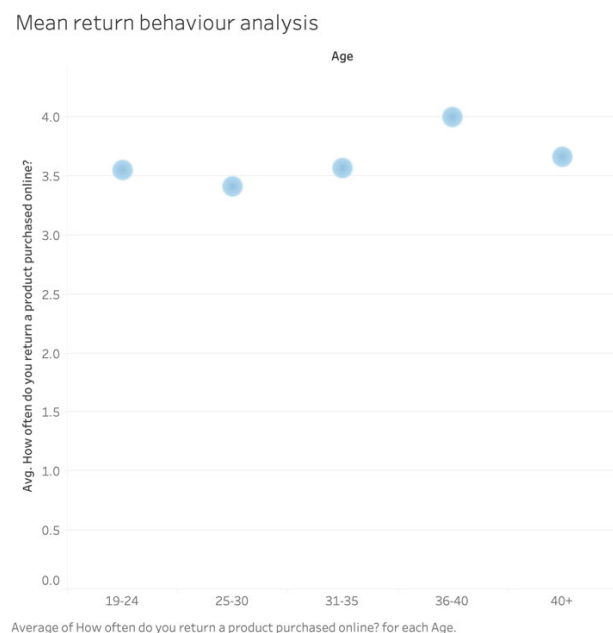
Note. From primary data collection, a chart created by the author using *Tableau*

4.3 Correlation Analysis

The correlation coefficients are shown in Table 16. The correlation coefficients may not be very high due to a smaller number of responses. The following results show that buying things on impulse and spending more than one's budget are positively correlated. Respondents who wondered if they really needed the product showed a positive correlation if they made the right choice after purchasing a product. There are some modest associations observed with variables like spending more than the budget, impulse buying, the gap between product expectations, making the right purchase decision, wondering about necessity, and the frequency of returning products.

Table 16

Correlation of each question

	Planning ahead	Frequency of shopping	Spending more than budget	Impulse buying	Gap between the product and my expectatio ns.	Whether I made the right purchase decision.	I wonder if I really needed it.	Quality up to my expectatio ns	The color varies	The fit is appropriat e	I did not like it or didn't suit me	I only return inappropria te products	Brands with easy return policies	How often do you return a product?
Planning ahead	1													
Frequency of shopping	-0.00758	1												
Spending more than budget	0.072001	0.256158	1											
Impulse buying	0.015284	0.187618	0.348575	1										
Gap between the product and my expectations.	0.09805	-0.172609	0.034233	0.052212	1									
Whether I made the right purchase decision.	0.162804	-0.128201	0.066456	0.133814	0.502761	1								
I wonder if I really needed it.	0.152278	0.060862	0.226806	0.242318	0.271508	0.479075	1							
Quality up to my expectations	0.030271	-0.222642	0.014975	-0.116659	0.275644	0.178084	0.163868	1						
The color varies	0.04236	-0.082306	0.043784	-0.11602	0.231636	0.159896	0.114201	0.12531	1					
The fit is appropriate	0.03938	-0.256503	-0.086636	-0.051265	0.182285	0.206504	0.159167	0.344515	0.179	1				
I did not like it or didn't suit me	0.016355	-0.022036	0.073733	-0.074716	0.169832	0.275059	0.172553	0.248874	0.208456	0.173552	1			
I only return inappropriate products	-0.121676	-0.087418	-0.013748	0.036048	0.087605	0.124411	0.144478	0.042274	0.014657	-0.067141	0.015532	1		
Brands with easy return policies	0.021183	-0.051216	0.010424	0.015008	0.104354	0.101329	0.185499	-0.087755	0.108306	-0.053087	0.045642	0.192258	1	
How often do you return a product?	0.138504	0.118802	0.139971	0.092233	0.109743	0.015732	0.181647	-0.002337	0.066182	0.014156	0.236407	0.00563	0.038037	1

Note. From primary data collection, the table was created by the author using *Microsoft Excel*

There is significantly no correlation between brands who have easy return policies with respondents returning the product which can be interpreted in a manner that brands that have easier return policies are more confident in their products and people tend to return less.

4.4 Cluster Analysis

The cluster analysis is done to study the overall return behavior of the customers based on the different factors due to which they tend to return the products that they buy online. Here we bifurcated the graph into 2 clusters, as shown in figure 5. Cluster one represents the customers from all age groups who tend to return the product more often, and cluster 2 represents the customers who have less tendency to return the product that they bought

online. In this analysis, we have taken different factors to measure the tendency of the return

of the product that the customer has bought online like why they decided to return the product

on the basis of the decision that they made, the gap that they found after receiving the product

and the expectation they had before receiving the product, they did not like the product, the

product didn't suit them, They brought the things on impulse, the color of the product varies to

what it was shown online, the fit of the product is appropriate the quality of the product is up

to their expectations or not and is they have purchased inappropriate products online.

Figure 5

Cluster Analysis to Understand Return Behavior
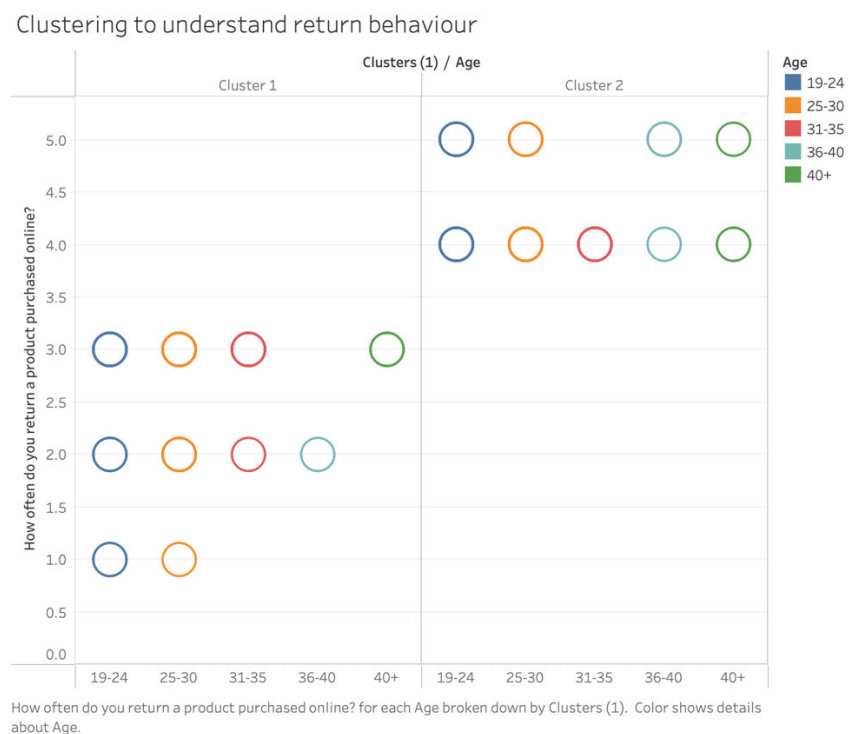
Note. From primary data collection, a chart created by the author using *Tableau*

Here we have analysed why a customer chooses a particular return behaviour and the

reasons driving their choice for the different age groups. For example, the customers in the age

group 25 to 30 who sometimes return the product have different factors driving their choice to do so. While they admit to occasionally doubting their purchase decisions and wondering if they truly needed the item, they don't frequently return products. This suggests that they generally exercise caution before making online purchases and try to make informed decisions. One factor that plays a significant role in their satisfaction is the quality of the product. These individuals find that the quality of the items they buy online often meets or exceeds their expectations. They appreciate receiving products that are well-made and durable, which reinforces their confidence in online shopping.

However, the color of the product often poses a challenge. They report that the actual color of the item can vary significantly from what was displayed online. This discrepancy sometimes leads to disappointment, as they had specific expectations based on the online images. Nonetheless, they don't consider this a dealbreaker and are willing to adapt their preferences if the overall product quality is satisfactory.

When it comes to the fit of the product, they find that it varies. While they occasionally encounter items that fit well, there are instances where the fit doesn't align with their expectations. Nevertheless, they don't consider this a significant issue, as they rarely return products solely based on poor fit.

Thus, the overall analysis gives significant outcomes regarding the buying and returning behavior of customers for the products they purchase online.

4.5 Hypothesis Testing and Inferential Statistics

To better understand the relationships and interactions between the independent variables in this study, a few hypotheses were developed. By examining the interdependence between

variables, we aim to gain a deeper understanding of the factors that influence certain outcomes. The hypotheses were formulated to understand the consumer behavior of and their relation to factors affecting to return of products purchased online. The hypotheses developed for this study are as follows:

Hypothesis 1 (H1). *Consumers who frequently make impulse purchases are more likely to return products purchased online.*

Hypothesis 2 (H2). *Consumers who frequently spend more than their budget are more likely to return products purchased online.*

Hypothesis 3 (H3). *Consumers who frequently find the gap between the actual product and their expectations are more likely to return products purchased online.*

Hypothesis 4 (H4). *Consumers who frequently buy things on impulse are more likely to spend more than their budget on online shopping.*

Hypothesis 5 (H5). *Consumers who frequently doubt their decision to buy are more likely to wonder whether they need it.*

Hypothesis 6 (H6). *Consumers who often do not like the product or if the product doesn't suit them are more likely to return products purchased online.*

These hypotheses were developed based on existing literature and theoretical frameworks that suggest potential relationships between these variables. We can confirm or disprove the suggested associations and provide empirical proof of the interdependence of these factors by testing these hypotheses.

To test these hypotheses, t-Test: Two-Sample Assuming Equal Variances from the Microsoft Excel data analysis tool pack was employed, given their suitability for examining the

relationships between independent variables. The significance level ($\alpha = 0.05$) ensures a stringent criterion for statistical significance.

4.6 Interpretation and Discussion of Findings

For H1, the p-value for the one-tailed test is calculated as 2.55504E-09, which is significantly lower than the significance level. Similarly, 5.11008E-09 is the calculated p-value for the two-tailed test. Both p-values are less than the 0.05 level of significance. We reject the null hypothesis based on the test results and conclude that there is a significant correlation between making impulsive purchases and returning online-bought goods. The negative t-statistic indicates that online shoppers who frequently make impulsive purchases are more likely to return products purchased online.

The p-value for H2 is higher than the significance level. Based on the test results, we fail to reject the null hypothesis, indicating that there is insufficient evidence to support the claim that consumers who frequently exceed their budget on online shopping are more likely to return products purchased online.

The p-value for the one-tailed test is calculated as 9.2134e-30, and the p-value for the two-tailed test is calculated as 1.8427e-29. Both p-values are significantly smaller than the significance level of $\alpha = 0.05$. The test results reveal a highly significant t-statistic, demonstrating a close connection between the perceived gap and return behavior. We reject the null hypothesis because the p-value is less than 0.05 and conclude that there is enough evidence to back up the assertion that customers who frequently find a discrepancy between the product and their expectations are more likely to return items they have bought online.

The test results for H4 have a p-value<0.05. Hence we reject the null hypothesis. There is sufficient evidence to support the claim that consumers who frequently buy things on impulse are more likely to spend more than their budget on online shopping.

The one-tailed test's p-value was calculated as 0.00046071, which is below the threshold for significance. Similarly, 0.00092142 is determined as the p-value for the two-tailed test. The significance level of 0.05 is significantly exceeded by neither p-value. Based on the test results, we reject the null hypothesis and conclude that there is sufficient evidence to support the claim that consumers who frequently doubt their decision to buy are more likely to wonder whether they need it.

The p-values are lower than the level of significance for H6, thus indicating that we have evidence to reject the null hypothesis and conclude that there is sufficient evidence to support the claim that consumers who often do not like the product or if the product doesn't suit them are more likely to return products purchased online.

5.0 Discussion and Implications

The study found that consumer behavior drives the rate of return, and gaps in the product, and consumer expectations, impulse buying behavior, and quality of the product impact the return rate of e-commerce fashion purchases. Firstly, the age group of 19-24 are making most purchases online to buy fashion products. Consumers who make impulse purchases tend to return the products more often, which is verified by H1. Consumers who find a gap between the actual product and their expectations from the product also tend to return more. Although we fail to support the claim that people who exceed their budget on online shopping return more, we successfully found empirical evidence that impulse shoppers tend to

spend more and often exceed their budget. The study also found that people who do not like the product on them or it did not suit them tend to return more. The mean score of 2.38 (Agree) for the question "I purchase only from brands that have easy return policies" indicates that people tend to prefer brands that have easy return policies.

Most of our previous studies are consistent with the findings of our study. This supports the notion that most studies in the similar field have reached similar conclusions. Several studies have indicated a positive correlation between impulse buying and rate of return. Similar conclusions were drawn by Lysenko-Ryba (2021). According to Wang and Qu (2017), return policies impact the consumer behavior. The consistency of our findings and earlier research contributes to the expanding body of knowledge and strengthens the literature's current consensus.

6.0 Summary and Conclusion

The findings of this study offer substantial evidence of how different factors affect return rates in online shopping. The likelihood of returns is higher among customers who frequently make impulsive purchases, highlighting the importance of impulsive buying tendencies in influencing return behavior. However, there is not enough data to prove that going over budget has an immediate effect on customer behavior. The analysis emphasizes the significance of controlling customer expectations to reduce return rates, as consumers are more likely to initiate returns when there is a discrepancy between the product they receive and their expectations. Additionally, it has been discovered that impulsive purchasing tendencies not only lead to higher return rates but also to spending that exceeds the budgeted amount. In post-purchase reflection and potential returns, doubts about purchase decisions

also play a part. These findings highlight the intricate relationship between consumer behavior and return rates, providing retailers with knowledge to create targeted plans and raise client satisfaction. Future research should examine additional factors influencing return behavior and address limitations like sample size.

Although customer purchase behavior has been researched for some time, customer return behavior is still a relatively unexplored area. Investigating customer perception, attitude, and awareness throughout the entire journey—from the point at which the need for a particular product is determined to the point at which it is used at home—is crucial. The traditional consumer perception, which can be distilled into three aspects: perceived risk, perceived quality, and perceived fairness, is the foundation for the consumer psychological perception of return policies. By implementing six sigma techniques in the production, merchandising, packaging, and delivery of the finished goods to customers, brands can reduce perceived risk related to return policies and improve perceived quality. The DMAIC approach can reduce the nonconformity of the products and streamline processes for fashion retailers.

Defining the problem is the first step in the methodology. This study identifies and concentrates on lowering the rate of returns. This will result in a greener supply chain and a further reduction of greenhouse gas emissions.

The second step is measuring the current rate of return. The retailers will measure their rate of return over a fixed period.

The next step is to analyze the process to identify the underlying causes of the issue or the process's weaknesses. Making a fishbone diagram of perceived quality in this situation will help people see where there are gaps between the product and their expectations and how to

close them. To better understand the nature of a particular piece of data and make possible future improvements, it should be analyzed.

During the improving stage, different statistical techniques are employed to generate potential process improvement strategies to reduce or eliminate the errors or defect rate as well as the root causes or process weaknesses.

Controlling/managing the improved process and maintaining the process adjustments is the final step.

The study summarizes consumer behavior and its relation to the rate of return along with the DMAIC methodology that can be adopted by retailers to reduce returns; there are some gaps in the study. One of the flaws was the comparatively small sample size of respondents. To improve the generalizability of the results, future research should aim to include a larger and more varied sample. As a result, the relationship between consumer behavior and the rate of return would be better understood. The application and assessment of the DMAIC (Define, Measure, Analyze, Improve, Control) methodology in lowering return rates can be the subject of future research. Researchers can evaluate the efficacy of interventions and process improvements suggested by DMAIC in actual retail settings by carrying out case studies or experiments.

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Appendix

Scales	Items
Perceived Information Overload	I think a large amount Of information Will distract my attention, 1 (strongly disagree) to 7 (strongly agree)
	I often feel that the information on online shopping platforms is too much and over-whelming. 1 (strongly disagree) to 7 (strongly agree)
	I often feel like there's more information on the platform than 1 can handle. 1 (strongly disagree) to 7 (strongly agree)
	I often find that there are so many choices that 1 doesn't want to make an effort to compare and choose. 1 (strongly disagree) to 7 (strongly agree)
Impulsive Buying Behavior	I sometimes spend more than my budget on online shopping. 1 (strongly disagree) to 7 (strongly agree)
	I sometimes buy things on impulse. 1 (strongly disagree) to 7 (strongly agree)
	Sometimes I want to buy something when 1 see a picture Of a product. 1 (strongly disagree) to 7 (strongly agree)
	I sometimes have a sudden urge to buy something, even if it's not in my shopping plan. 1 (strongly disagree) to 7 (strongly agree)
Cognitive Dissonance	After receiving the product, I sometimes find that there is a gap between it and my expectation, 1 (strongly disagree) to 7 (strongly agree)
	After receiving the product, I sometimes doubt whether I made the right purchase decision. 1 (strongly disagree) to 7 (strongly agree)
	After receiving the product, I wondered if I really needed it. 1 (strongly disagree) to 7 (strongly agree)
	After receiving the product, I would wonder if the merchant was making false claims. 1 (strongly disagree) to 7 (strongly agree)

Online Return Intention	Even if the return process is troublesome, I will choose to return. 1 (strongly disagree) to 7 (strongly agree)
	I only use the return to deal with inappropriate products purchased online. 1 (strongly disagree) to 7 (strongly agree)
	As long as the product doesn't fit, I intend to return it. 1 (strongly disagree) to 7 (strongly agree)
	Even if I buy something cheap, I will choose to return it. 1 (strongly disagree) to 7 (strongly agree)
	I think it is the right decision to return the unsuitable product. 1 (strongly disagree) to 7 (strongly agree)
Perceived environmental effectiveness	I realize that consumer behavior affects society and the environment. 1 (strongly disagree) to 7 (strongly agree)
	I realize that reducing returns is environmentally friendly. 1 (strongly disagree) to 7 (strongly agree)
	I believe I can make a contribution to the solution Of environmental problems. 1 (strongly disagree) to 7 (strongly agree)
	I believe that reducing returns can have a positive impact on the environment. 1 (strongly disagree) to 7 (strongly agree)

Note. Questionnaire to understand the impact of information overload on e-commerce purchases. The questionnaire is from Lv, J., & Liu, X. (2022). The Impact of Information Overload of E-Commerce Platform on Consumer Return Intention: Considering the Moderating Role of Perceived Environmental Effectiveness. *International Journal of Environmental Research and Public Health*, *19*(13), 8060. https://doi.org/10.3390/ijerph19138060