Streamlining Style: Reducing Returns in Fast Fashion E-commerce with Lean Six Sigma

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Abstract

The rise of fast fashion e-commerce, driven by consumer demand for trendy, affordable and quickly produced clothing, has led to high return rates, impacting customer satisfaction, profitability and sustainability. This study investigates the causes of 20% return rate of an online retailer, aiming to reduce to 12-15% within one month using Lean Six Sigma Techniques. Utilizing the DMAIC Cycle, the research combined qualitative surveys and quantitative return data analysis. Root Cause Analysis revealed that 75% of returns were due to quality and fit issues. In response, clearer product descriptions, enhanced sizing guides, and stricter supplier audits were implemented. As a result, return rates decreased to 15%, enhancing customer satisfaction, boosting sales, and achieving cost savings. The findings demonstrate that Lean Six Sigma effectively reduces return rates and boosts customer satisfaction, making it a valuable strategy for online retailers. Hypothesis testing confirmed significant improvements in both customer satisfaction and purchase frequency.

Introduction

The intersection of technology and the Internet of Things (IoT) has transformed industries, with the COVID-19 pandemic accelerating e-commerce growth, especially in fast fashion [1]. Consumers increasingly turned to online shopping, but this rapid shift led to significant challenges. In 2022, the fashion e-commerce sector faced $218 billion in returns [2], raising concerns among retailers from 2% in 2022 to 49% in 2023 [3]. This trend highlights a critical problem that necessitates immediate attention and solutions.

This research addresses a fast-fashion online store shipping to Puerto Rico and the United States with 20% return rate. To tackle this issue, the project aims to implement Lean Six Sigma techniques to reduce return rates, streamline process, enhance product quality and provide actionable insights benefiting the company and customers.

Background

The rise of smartphones and high-speed internet has significantly boosted online shopping, accelerated by the COVID-19 pandemic, pushing U.S. e-commerce trend to 27% by June 2020 [4]. Many consumers, particularly younger ones, prefer online clothing shopping for its convenience [5]. Social media plays a crucial role in marketing and fueling fast fashion's rapid cycles and short lead times; for instance, Zara delivers in two weeks, Forever 21 six weeks and H&M eight weeks [6], and Shein in ten days [7]. However, the fast fashion sector faces high return rates, often ranging from 20% to 50% [8], which negatively impacts profitability and sustainability. The fast fashion model fosters a culture of disposability through frequent purchasing and discarding. "Fast" denotes rapid production and the short lifespan of lower-quality garments, often resulting in customer dissatisfaction. Brands face the challenge of balancing speed, quality, and sustainability. To address these issues, applying Lean Six Sigma, particularly the DMAIC framework, has been effective. Studies [9] [10] indicate that structured processes can significantly reduce defects and return rates, enhancing quality and customer satisfaction while promoting a sustainable business model through continuous improvement and waste reduction.

Problem

The fast-fashion online store is experiencing a 20% return rate, causing customer dissatisfaction, threatening profitability and sustainability due to unsellable returned products that contribute to landfill waste. This research is vital for improving product quality, lowering return rates, and enhancing customer satisfaction, which are essential for staying competitive in a fast-changing market.

Methodology

The research employed a DMAIC (Define, Measure, Analyze, Improve, Control) Framework and utilized a mixed-methods approach integrating qualitative surveys and quantitative data analysis through hypothesis testing and statistical methods.

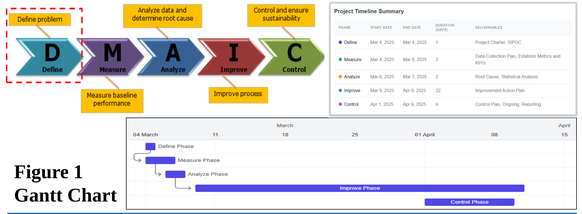


Figure 1
Gantt Chart

Results and Discussion

DEFINE PHASE

At the start of the study, the problem was identified with owner's input, and parameters set in a Project Charter. To assess the issue's severity and significance for the store, the return rate since the online clothing store launch in 2018 was evaluated, as shown in Figure 2, revealing an increasing 8%, with significant spikes following the pandemic. A SIPOC diagram shown on Figure 3, was created to outline the manufacturing to delivery process, clarifying the scope and identifying involved departments.

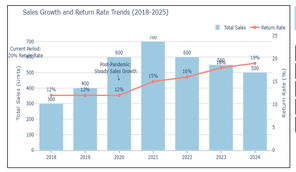


Figure 2
Monthly Average Sales/Returns

Figure 3
SIPOC Diagram

MEASURE PHASE

To investigate the causes of returns, a data collection plan was established which involved reviewing online store records over the last three months to look for patterns/trends and conducting VoC surveys to measure 5 key metrics: return rate by category/type, return reasons, product quality, customer satisfaction and cost per return. Feedback was collected from the 100 customers who returned items to evaluate satisfaction and reasons. A follow-up survey, was conducted with the 15 customers who cited damage/defects as their return reason to assess material quality metrics. From this, an E-commerce Customer Journey Process Flowchart was created to identify potential bottleneck.

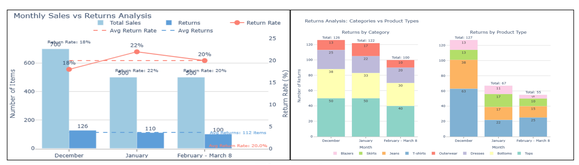


Figure 4
Return Rate by month/category/type

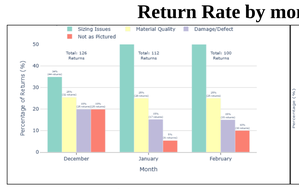


Figure 5
Return Reasons

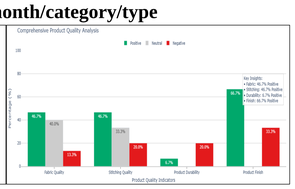


Figure 6
Product Quality

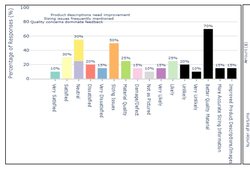


Figure 7
Customer Satisfaction

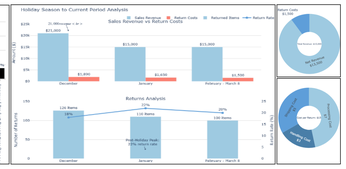
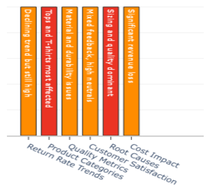


Figure 8
Cost per Return

ANALYZE PHASE

Findings show that returns, particularly for tops/shirts and bottoms/jeans, are largely due to low quality and sizing (75% of returns). Resulting in an average return rate of 20%, affecting CSAT, with 35% reporting dissatisfaction. Customer feedback reveals that 70% suggest improvements in quality and sizing accuracy, indicating an opportunity to enhance customer satisfaction and lower return rates.



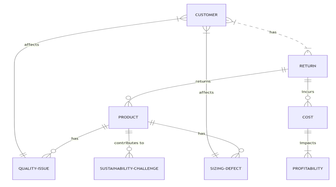


Figure 9
Summary of Findings

To better understand the root causes, analysis of survey and data using fishbone and Pareto chart identified sizing issues as the leading cause of 50% returns, suggesting it is the most impactful area for reduction.

Root Causes	Key Factor	Supporting Data
Inconsistent measurement standards	Sizing issues	Sizing problems account for 50% of returns. Highest return reason.
Supplier quality variations	Material Quality	Material quality is the second most common reason for returns (25%), with 46% satisfaction and 33% citing durability issues.
Quality control gaps due to production rush	Manufacturing Defects	Defects are the third-leading cause of returns (15%), with VOC data indicating issues with durability, fabric quality, and finish.
Inaccurate Product Presentation	Not as pictured	10% of returns indicate a mismatch between the product and image, 35% negative feedback

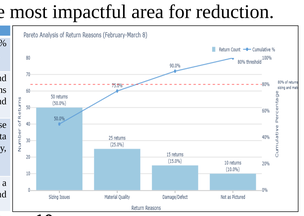


Figure 10
Root Cause Analysis: Pareto Chart

IMPROVE PHASE

Improvement implementation occurred from March 9 to April 9, focusing on quality and sizing in top return categories tops/bottoms.

Root Causes	Actions for Improvement
Inconsistent measurement standards	Improve Sizing Accuracy by reviewing size charts, sizing guidelines, offer virtual try-on
Supplier quality variations	Enhance Material Quality by improving Supplier relationships by conducting more thorough audits, negotiate better quality standards, implement more rigorous QC.
Quality control gaps due to production rush	Strengthen quality control by implementing more thorough inspections once supplier shipment arrives and before shipping.
Inaccurate Product Presentation	Improve Product Photos and Descriptions by accurately representing product description, use high quality multiple angle shots
Simplify the Returns Process	Employee training for efficient returns handling. Easy-to-use returns portal where customers can initiate returns quickly. Automate refund processing to enhance efficiency; offer exchanges (store credit) over refunds to keep revenue

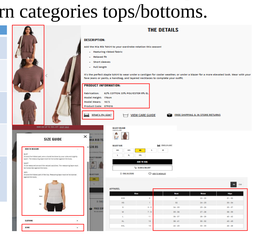


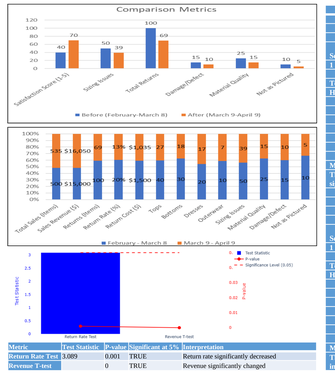
Figure 11
Actions for Improvement

CONTROL PHASE

Item to be monitored	Frequency of monitoring	Why?
Return Reasons	Monthly	to pinpoint specific issues and take proactive measures to address concerns.
Product-based returns		to identify products that consistently underperform or fail to meet customer expectations.
Customer feedback loop		to identify trends and areas for improvement in product quality and customer satisfaction.
Cost Management		to ensure that return rates remain manageable.

Figure 12
Monitoring Plan

Following improvements, key metrics were re-evaluated and a post implementation survey made. Results showed a new return rate of 13%, within target range. Return Reasons decreased in fit-related to 39 and quality-related to 25. CSAT increased to 70%. Cost per return decreased due to fewer returns resulting in cost savings. Hypothesis testing confirmed significant increases in both customer satisfaction and purchase frequency.



Metric	Test Statistic	P-value	Significant at 5%	Interpretation
Return Rate Test	3.089	0.001	TRUE	Return rate significantly decreased
Revenue T-test		0	TRUE	Revenue significantly changed

AVERAGING HYPOTHESIS TESTING				
CLIENT SATISFACTION				
Hypothesis				
Ho: μ a	EQUALS TO	μ b		
Select one	MORE THAN	LESS THAN	NOT EQUAL	
1 = YES		1		
H1: μ a	LESS THAN	μ b		
Test with Known Variance (Normal Distribution)				
Hypothesis Test Results	BEFORE	AFTER		
Min	3.00	3.00		
Sigma	1.22	1.1		
X Bar	3.00	3.75		
N	100	100		
Z exp	-4.57			
P-value	0.000			
Alpha	0.05			
Mio A is less than Mio B				
The average before is lower than the average after, or satisfaction increased significantly.				

AVERAGING HYPOTHESIS TESTING				
WILLING TO BUY PRODUCT				
Hypothesis				
Ho: μ a	EQUALS TO	μ b		
Select one	MORE THAN	LESS THAN	NOT EQUAL	
1 = YES		1		
H1: μ a	LESS THAN	μ b		
Test with Known Variance (Normal Distribution)				
Hypothesis Test Results	BEFORE	AFTER		
Min	3.00	3.00		
Sigma	1.20	1.1		
X Bar	3.15	3.80		
N	100	100		
Z exp	-3.95			
P-value	0.000			
Alpha	0.05			
Mio A is less than Mio B				
The average before is lower than the average after, or purchases would increase significantly.				

Figure 13
Before/After Metrics, Statistical Analysis, Hypothesis Testing

Statistical analysis indicated a significant decrease in return rates at the 5% level, and revenue rose from $15,000 to $16,050.

Conclusions

The objectives of the project were successfully achieved. The key factors contributing to high return rates were identified, primarily linked to low product quality and sizing inaccuracies. By implementing Lean Six Sigma (LSS) methodology, significant improvements were made in quality and operational processes. The targeted strategies led to a reduction in return rates from 20% to 13% within one month, within the target range of 12-15%. This not only enhanced overall customer satisfaction by ensuring that products met or exceeded expectations regarding quality and fit but also resulted in cost savings due to lower return-related expenses. Furthermore, hypothesis testing confirmed notable increases in customer satisfaction and purchase frequency, indicating a positive impact on sales performance as well.

Future Work

While the research yielded positive results, the one-month timeframe limits its ability to capture long-term trends, and focusing solely on top categories may overlook other factors influencing return rates, such as production cycle, shipping process and inventory management. Future research should investigate additional factors affecting return rates beyond quality/sizing, and extend the duration of studies to better understand long-term impacts on return rates and customer satisfaction.

Acknowledgements

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And others.