

Implementation of Statistical Quality Control in Managing Product Defects in a Thrift Store

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Article Information		Abstract
Submission date	4 February 2026	Research aim : This study aims to analyze the implementation of quality control in maintaining the quality of thrift products at AG SECOND Thrift Store, Kediri, Indonesia, by applying Statistical Quality Control (SQC) tools to identify dominant defect types, evaluate process stability, and examine the effectiveness of existing inspection procedures. Design/Method/Approach : This research employed a quantitative descriptive approach using Statistical Quality Control (SQC). Data were collected through direct observation of inspection processes, in-depth interviews with store owners and employees, and secondary data derived from monthly records of defective products over an eleven-month period. The analysis utilized five SQC tools: check sheets to record defect frequency, histograms to visualize defect distribution, Pareto charts to determine dominant defects, p-control charts to assess process stability, and fishbone diagrams to identify root causes of defects. Research Finding : The study identified three dominant defect types—missing buttons, tears, and stains. Although the quality control process was statistically under control, recurring defects indicate the need for systematic improvement in inspection procedures. Theoretical contribution/Originality : This research extends the application of Statistical Quality Control from manufacturing contexts to thrift retail businesses characterized by high product variability and non-standardized inputs. Practitioner/Policy implication : Practically, the findings provide actionable insights for thrift business owners to enhance quality inspection procedures, establish clearer quality standards, and improve employee training to reduce defect rates and ensure product consistency. From a policy perspective, the results may inform small and medium-sized retail enterprises and local business development programs on the importance of implementing systematic quality control practices to support sustainable thrift business operations. Research limitation : This study is limited to one thrift store and focuses only on physical defect categories, which may restrict the generalizability of the findings. Keywords : Quality Control, Statistical Quality Control, Thrift Products, Product Quality, Defect Analysis
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Introduction

The rapid growth of global competition has intensified challenges for businesses to maintain product quality and customer satisfaction [1]. In highly competitive markets, quality

has become a critical factor influencing consumer trust and purchasing decisions [2,3]. Businesses are increasingly required to implement effective quality control systems to ensure consistency and reliability in their products, particularly in retail sectors where customer perceptions play a decisive role.

In recent years, the thrift fashion industry has experienced significant growth in Indonesia, driven by increasing awareness of sustainable consumption, affordability, and the uniqueness of second-hand products. Thrift stores offer consumers an alternative to fast fashion by extending the lifecycle of clothing and reducing textile waste. Despite these advantages, thrift businesses face distinct quality-related challenges due to the heterogeneous nature of second-hand products. Variations in material condition, durability, and completeness make quality assurance more complex compared to conventional manufacturing industries.

Previous studies have emphasized the importance of quality control in improving product performance and reducing defects. Research applying Statistical Quality Control (SQC) has demonstrated its effectiveness in identifying defect patterns, stabilizing production processes, and supporting continuous improvement across various industries. Empirical findings consistently show that product quality significantly influences consumer satisfaction and purchasing decisions. However, most existing studies focus on manufacturing or standardized production environments, where inputs and processes are relatively uniform.

In contrast, limited attention has been given to the application of Statistical Quality Control in non-conventional retail sectors such as thrift stores, where products are inherently diverse and lack standardized specifications. The absence of structured inspection procedures in many thrift businesses often leads to inconsistent quality, customer complaints, and reduced trust. This gap indicates the need for empirical investigation into how quality control principles can be adapted to manage product variability in second-hand clothing businesses.

This study addresses this research gap by analyzing the implementation of quality control in a thrift store using Statistical Quality Control methods. Unlike previous studies that concentrate on mass-produced apparel, this research focuses on second-hand clothing characterized by high variability in condition and origin. The novelty of this study lies in extending SQC application to thrift retail operations, providing empirical evidence on its effectiveness in a non-manufacturing context.

The purpose of this study is to analyze the implementation of quality control in maintaining thrift product quality at AG SECOND Thrift Store, Kediri, Indonesia. This article is structured as follows: Section 2 describes the research method, Section 3 presents the results and discussion, and Section 4 concludes with key findings, contributions, and research limitations.

Statement of Problem

The rapid growth of thrift retail businesses has increased competition among sellers of second-hand clothing, making product quality a crucial factor influencing consumer purchasing decisions. Thrift products are characterized by high variability in condition, completeness, and durability, which poses significant challenges for business owners in maintaining consistent quality standards. In many thrift stores, quality inspection is conducted

without standardized procedures, resulting in recurring product defects that may reduce customer satisfaction and trust.

AG SECOND Thrift Store faces similar challenges in managing product quality, particularly related to physical defects such as missing buttons, tears, and stains. Although quality inspections are routinely conducted, the effectiveness of existing quality control practices has not been systematically evaluated. The absence of structured quality control analysis may limit the store's ability to identify dominant defect types, assess process stability, and implement targeted improvement strategies. Therefore, it is essential to examine how quality control is implemented and whether Statistical Quality Control (SQC) methods can effectively support quality assurance in thrift product management.

1.1. Research Objectives

Based on the problem statement above, the objective of this study is to analyze the implementation of quality control in maintaining the quality of thrift products at AG SECOND Thrift Store using Statistical Quality Control methods. Specifically, this research aims to identify dominant types of product defects, evaluate the stability of the quality inspection process, and analyze the root causes of defects through systematic quality control tools. By applying Statistical Quality Control, this study seeks to provide empirical insights into the effectiveness of quality control practices in thrift retail businesses and offer recommendations for improving product quality consistency.

2. Method

This study employed a quantitative descriptive approach to analyze the implementation of quality control in thrift product management. The research was conducted at AG SECOND Thrift Store, Kediri, Indonesia, which operates in the resale of second-hand clothing. The focus of the study was to examine product defects and evaluate quality control practices using Statistical Quality Control (SQC) techniques.

Data were collected through direct observation, in-depth interviews, and secondary data documentation. Observation was conducted to examine the operational process of quality inspection, including product sorting, physical condition checking, cleaning, and preparation before sale. Interviews were carried out with the store owner and employees responsible for quality control to obtain information regarding quality standards, inspection procedures, and challenges faced during the quality control process. Secondary data consisted of monthly records of defective products over an eleven-month period.

The data analysis applied Statistical Quality Control methods to identify defect patterns and evaluate process stability. Five quality control tools were used: check sheets to record defect frequency, histograms to visualize defect distribution, Pareto charts to identify dominant defect types, p-control charts to assess whether the process was statistically under control, and fishbone diagrams to analyze the root causes of defects. These analytical tools enabled a systematic evaluation of quality control performance and provided a basis for identifying improvement opportunities in the thrift product inspection process.

Results and Discussion

Results

This section presents the results of the quality control analysis conducted at AG SECOND Thrift Store using Statistical Quality Control (SQC) tools. The analysis focused on identifying defect types, defect frequency, and process stability based on eleven months of inspection data.

Check Sheet Analysis

The check sheet was used to record the number of defective products based on three defect categories: stains, missing buttons, and tears. Table 1 summarizes the inspection results.

Table 1. Summary of product Defects Based on Check Sheet

Mont	Sample Size	Stains	Missing Buttons	Teasr	Total defects	Defect Proportion
January	100	4	12	7	23	0.23
February	100	2	10	5	17	0.17
March	100	3	14	6	23	0.23
April	100	5	11	4	20	0.20
May	100	3	13	7	23	0.23
June	100	5	10	6	21	0.21
July	100	2	11	5	18	0.18
August	100	3	12	5	20	0.20
September	100	3	14	3	20	0.20
October	100	2	16	6	24	0.24
November	100	2	13	3	18	0.18
Total	1.100	34	136	57	227	2.07

Source: Authors' calculation based on quality inspection records at AG SECOND Thrift Store

3.1.2 Histogram and Pareto Analysis

Histogram analysis illustrates the distribution of defect occurrences across inspection periods, while the Pareto chart identifies dominant defect types. The results indicate that missing buttons represent the most frequent defect, followed by tears and stains.

This finding confirms that quality issues are not evenly distributed, but concentrated in specific defect categories that require priority corrective actions [2,6].

Figure 1. Histogram of Thrift Product Defects

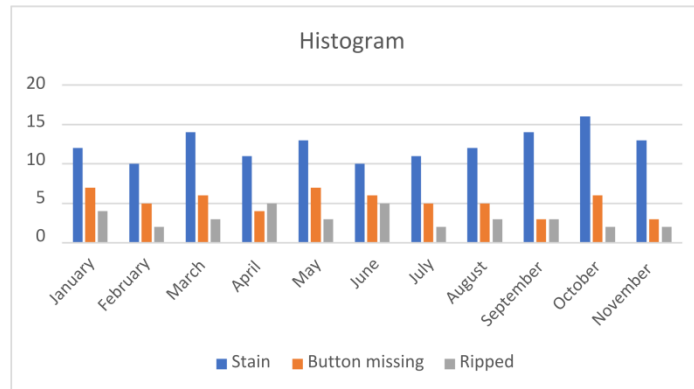
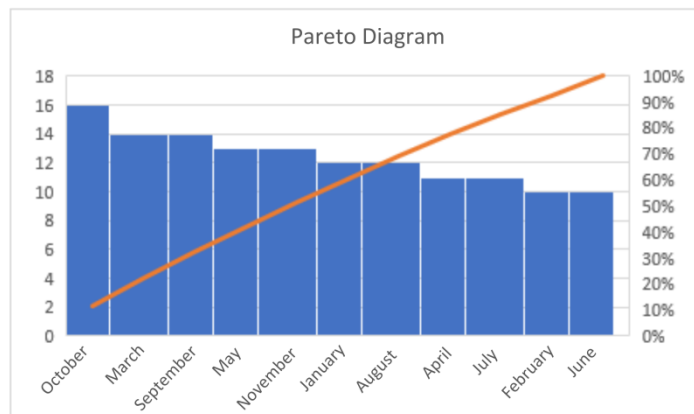


Figure 2. Pareto Chart of Thrift Product Defects



Control Chart (P-Chart) Analysis

To evaluate process stability, a p-control chart was applied. The calculation produced the following values:

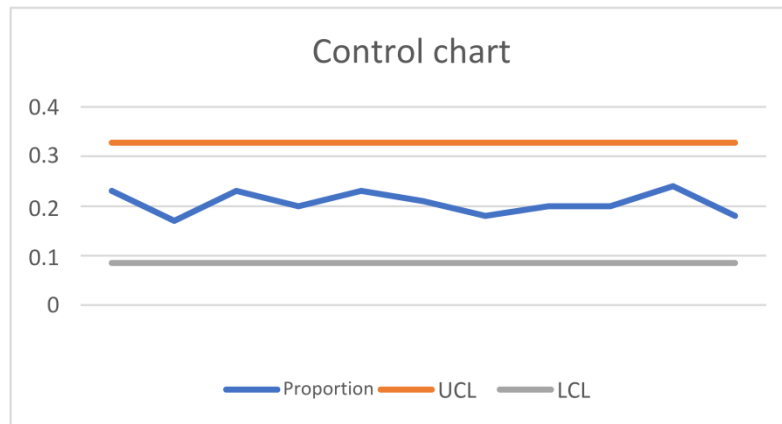
Central Line (CL) = 0.206

Upper Control Limit (UCL) = 0.328

Lower Control Limit (LCL) = 0.085

The control chart results show that all monthly defect proportions fall within the control limits, indicating that the quality control process remains statistically under control, despite the presence of defects.

Figure 3. Control Chart



Fishbone Diagram Analysis

The fishbone diagram was used to identify root causes of product defects. The analysis revealed three main contributing factors:

1. Method – unclear or inconsistent quality inspection procedures
2. Human factors – limited inspection skills and lack of standardized training
3. Material – varying quality of second-hand clothing sourced from suppliers

These factors collectively contribute to the occurrence of defects during the quality inspection process.

Discussion

The results indicate that Statistical Quality Control (SQC) is an effective tool for evaluating quality control performance in thrift product management. The dominance of missing buttons as the primary defect suggests that mechanical components of clothing require more detailed inspection prior to sale.

Although the p-control chart confirms that the process remains within statistical control limits, the relatively high number of defects highlights the need for continuous improvement. This finding supports previous studies that emphasize the importance of systematic quality control to reduce defect rates and improve product consistency.

The fishbone analysis further demonstrates that quality issues in thrift businesses are influenced not only by inspection methods but also by human and material factors. Unlike conventional manufacturing, thrift products exhibit high variability, requiring flexible and adaptive quality control strategies. Therefore, the implementation of standardized inspection procedures and employee training is crucial to enhance quality assurance in second-hand clothing businesses.

Conclusion

This study analyzed the implementation of quality control in managing thrift product quality at AG SECOND Thrift Store using Statistical Quality Control (SQC) methods. The results indicate that the dominant product defects consist of missing buttons, tears, and stains. Although the p-control chart analysis shows that the quality control process remains statistically under control, the recurring occurrence of defects suggests that quality improvement efforts are still required to reduce defect rates and enhance overall product consistency [4,5].

Theoretically, this research contributes to the literature by extending the application of Statistical Quality Control beyond conventional manufacturing settings to non-standardized retail environments, particularly thrift stores characterized by high product variability. The findings demonstrate that SQC tools can be effectively adapted to analyze and evaluate quality control performance in second-hand clothing businesses. This study provides empirical evidence that quality control principles remain relevant even in contexts with heterogeneous inputs and non-uniform product conditions.

Practically, the findings offer valuable insights for thrift business owners to improve inspection procedures, strengthen employee training, and establish clearer quality standards to minimize defects. However, this study is limited to a single thrift store and focuses only on physical defect categories. Future research is recommended to involve broader samples, compare multiple thrift businesses, and incorporate additional quality dimensions such as customer perception and post-purchase satisfaction [6].

Content Attribution

The authors acknowledge the use of Chat GPT version 21 in the research, writing, data analysis, etc., of this work. The AI application served as a tool for searching journals for reference. It is important to note that the AI-generated content was not copied verbatim but was thoroughly reviewed, edited, and curated by the authors to ensure the accuracy, authenticity, and integrity of the information contained therein. Individual judgment and decisions significantly contributed to the interpretation and validation of this AI output. Therefore, the final results presented represent a collaboration between humans and AI.

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