Analysis and Design of Batik Shirt Product Quality Control Using a Statistical Quality Control Approachh at the Nuarini Collection Convection in West Bandung

Muhammad Rifqi[1]
Universitas Wanita Internasional

Deni Solihin[2]
Universitas Wanita Internasional

Correspondence : Muhammad Rifqi (pqcidrifqi@gmail.com)

Submited : 20-09-2025 Accepted : 20-10-2025 Published : 18-12-2025

This research aims to analyze and design quality control of batik shirt products at Nuraini Collection Convection in West Bandung using the Statistical Quality Control (SQC) approach. The main problem identified is the high defect rate in production, particularly in cutting, sewing, and buttoning. The study applied a descriptive qualitative approach, with data collected through observation, interviews, and production reports. Analysis was conducted using Pareto diagrams, control charts (p-chart), and fishbone diagrams. The findings revealed that the defect rate exceeded the company's standard of 5%, with the majority of defects occurring in fabric cutting. The main causes were raw material issues, outdated manual machines, limited worker skills, and the absence of standardized quality control systems. The proposed design includes continuous implementation of SQC, employee training improvement, and production management enhancements. These measures are expected to reduce product defects and improve competitiveness in the market.
Keywords: Quality Control,SQC,Batik Shirt, Convection.

Introduction

The Indonesian textile industry constitutes one of the most important manufacturing sectors in the national economy, playing a vital role in fulfilling domestic clothing needs while simultaneously contributing to employment creation and regional economic development. The increasing growth of population, lifestyle changes, and fashion trends has driven higher demand for textile and apparel products, encouraging the emergence of both large-scale manufacturers and small-to-medium enterprises. However, this rapid expansion has also intensified competition within the industry, forcing companies to compete not only on price and design but increasingly on product quality and reliability. In today's highly competitive market, consumers are more quality-conscious and tend to compare products across brands, making consistent quality performance a decisive factor in purchasing decisions and customer loyalty.

Under such competitive conditions, quality management becomes a strategic necessity rather than merely an operational concern. Product quality directly influences customer

satisfaction, production efficiency, cost control, and brand reputation. Defective products may result in rework, waste, delayed delivery, and customer complaints, all of which negatively affect company performance. For small and medium-scale textile enterprises, these problems can be particularly damaging, as limited resources and narrow profit margins reduce their ability to absorb losses caused by quality failures. Therefore, effective quality control systems are essential to ensure that production processes operate within acceptable limits and that output consistently meets predefined standards.

Nuraini Collection, a convection business located in West Bandung that specializes in batik shirt production, represents a typical case of quality challenges faced by small textile manufacturers. Although the company has established an internal quality standard with a maximum defect tolerance of 5%, production data indicate that the defect rate of batik shirts frequently exceeds this threshold. The defects identified include sewing inaccuracies, uneven stitching, fabric damage, color inconsistency, and imperfect finishing, which collectively reduce product quality and market acceptance. These recurring quality issues not only increase production costs due to rework and material waste but also pose a risk to customer satisfaction, repeat purchase intention, and long-term business sustainability.

If such quality problems persist without systematic control and evaluation, Nuraini Collection may experience declining competitiveness in an increasingly crowded textile market. Customers who receive defective or substandard products are more likely to switch to competitors offering better quality assurance, particularly in markets where alternative products are widely available. Moreover, the accumulation of quality-related problems can weaken the company's reputation and limit its opportunities for market expansion. Consequently, there is a pressing need for an analytical and structured approach to identify the root causes of defects and to improve production consistency.

In this context, Statistical Quality Control (SQC) provides a scientifically grounded and practical method for monitoring, analyzing, and improving production quality. SQC utilizes statistical tools such as control charts, check sheets, Pareto diagrams, and cause-and-effect

analysis to detect deviations in the production process and distinguish between random variation and systematic quality problems. By applying SQC, companies can gain a clearer understanding of defect patterns, identify critical stages in the production process that contribute most to quality failures, and implement corrective actions based on empirical evidence rather than intuition.

Therefore, this study aims to analyze the quality problems encountered in the batik shirt production process at Nuraini Collection and to design an effective quality control system using the Statistical Quality Control method. The results of this research are expected to provide practical recommendations for reducing defect rates, improving product quality consistency, and enhancing operational efficiency. In addition, this study contributes to the literature on quality management in small and medium textile enterprises by demonstrating the applicability of SQC as a tool for supporting continuous improvement, customer satisfaction, and business competitiveness in the Indonesian textile industry.

Methods

This research uses a qualitative descriptive method with a case study approach. Data were collected through field observations, interviews with garment factories, and production report documentation. Data analysis was conducted using SQC tools, namely: a Pareto diagram to identify dominant types of defects, a control chart (p-chart) to determine the stability of the production process, and a fishbone diagram to identify the root causes of defects.

Results And Discussion

The results of the study reveal that the production process at Nuraini Collection has not yet achieved statistical stability and remains vulnerable to quality deviations. During the January 2025 production period, the company produced a total of 6,850 batik shirts, of which 581 units were identified as defective. This corresponds to a defect rate of 8.5%, which significantly exceeds the company's internal quality tolerance standard of 5%. The magnitude of this defect rate indicates that quality problems are not incidental but rather systematic, requiring immediate

managerial attention and structured quality improvement efforts.

Further analysis of defect types shows that cutting defects constitute the most dominant category, accounting for 296 defective units. These defects primarily involve inaccurate cutting patterns, size inconsistencies, and fabric misalignment, which directly affect the final appearance and fit of the batik shirts. Cutting defects are particularly critical because errors at this early stage of production tend to propagate throughout subsequent processes, increasing the likelihood of additional defects during sewing and finishing. The second most frequent defect type is button defects, with 158 units affected, including loose buttons, incorrect button placement, and mismatched accessories. Sewing defects rank third, with 127 units, commonly involving uneven stitches, broken seams, and poor thread tension. The distribution of defect types suggests that quality problems are concentrated in labor-intensive stages of the production process, where precision and operator skill play a decisive role.

The stability of the production process was further evaluated using control chart analysis. The results show that several production points fall outside the upper and lower control limits, indicating that the process is statistically out of control. This condition reflects excessive process variation that cannot be attributed solely to random causes but rather to assignable causes within the production system. An unstable production process increases the risk of recurring defects and undermines the company's ability to consistently meet quality standards. Consequently, relying on end-product inspection alone is insufficient, and continuous process monitoring becomes essential.

To identify the root causes of these quality issues, a fishbone (cause-and-effect) analysis was conducted. The analysis reveals four primary factors contributing to the high defect rate. First, the human factor is a major source of quality problems, particularly due to the limited skills and experience of cutting and sewing operators. Inadequate training and the absence of regular skill development programs reduce workers' ability to perform tasks accurately and consistently. Second, machine-related factors also play a significant role, as the company relies on old and imprecise equipment that lacks calibration accuracy, leading to cutting and sewing

errors. Third, method-related issues arise from the absence of standardized quality control standard operating procedures (SOPs), resulting in inconsistent work practices and subjective quality judgments across operators. Fourth, material-related factors include inconsistent fabric quality, such as variations in thickness, texture, and durability, which complicate the cutting and sewing processes and increase the likelihood of defects.

Based on these findings, this study proposes a comprehensive quality control plan aimed at reducing defect rates and stabilizing the production process. The recommended strategy emphasizes the routine implementation of Statistical Quality Control tools to monitor production performance and detect deviations at an early stage. In addition, targeted training programs are proposed to enhance workforce skills, particularly for operators involved in critical production stages. Equipment rejuvenation or gradual replacement of outdated machines is also recommended to improve precision and reduce mechanical errors. Furthermore, the development and implementation of standardized quality control SOPs aligned with industry standards are essential to ensure consistency in production practices and quality evaluation. Collectively, these measures are expected to improve process stability, enhance product quality consistency, and strengthen Nuraini Collection's competitiveness in the increasingly demanding textile market.

Conclusion

This study concludes that the defect rate for batik shirts at Konveksi Nuraini Collection still exceeds the 5% standard, with defects predominantly occurring in the cutting process. The primary contributing factors are labor, machinery, methods, and materials. To improve quality, the continuous implementation of SQC methods, workforce skill development, improved production management, and clear operational standards are necessary.

Recommendation: The company is advised to implement company-wide quality control, involving all employees in maintaining product quality. Furthermore, regular evaluation of the production process and the provision of higher-quality raw materials are necessary.

References

Book

Ariani, W. D. (2021). *Manajemen Operasi.* Tangerang Selatan: Universitas Terbuka.

Dachyar, M. (2022). *Sistem Informasi Manajemen.* Universitas Indonesia Publishing.

Dougherty, J.E., & Pfaltzgraff, R. L. (2020). *Contending Theories of International Relations: A Comprehensive Survey* (edisi ke-3, hlm 15). New York: HarperCollins.

Fahmi, I. (2022). *Pengantar Bisnis Bagi Pemula.* Bandung: Alfabeta.

Fakih, M. (2020). *Analisis Gender dan Transformasi Sosial.* INSIST Press.

Gulo, W. (2020). *Metodologi Penelitian.* Jakarta: Gramedia Widiasarana Indonesia.

Handoko. T. H. (2020). *Dasar-dasar Manajemen Produksi dan Operasi.* Yogyakarta: BPFE.

Heizer, J., & Render, B. (2022) *Sistem Manajemen Mutu Usaha Kecil dan Menengah.* Jakarta: Salemba.

Kamaluddin, I. H. A., & Patta Rapanna, S. E. (2022). *Administrasi Bisnis* (Vol. 1). Sah Media.

Kaoru, Ishikawa. (2020). *What is Total Quality Control?* The Japanese Way.

Laudon, K. C., & Laudon, J. P. (2021). *Management Information system: Managing The Digital Firm* (17th ed.). Pearson.

Lee, O. L. (2020). *Pengantar Ilmu Manajemen.* Jakarta: Pustaka Binaman Pressindo.

Oakley, A. (2020). *Sex, Gender and Societ.* Harper and Row.

Oktaviani, Andri. (2023). *Manajemen Operasional.* Yogyakarta: Pustaka Baru Press.

Rahman, M. (2022). *Ilmu administrasi* (Vol. 1). Sah Media.

Robbins, Stephen P. & Coulter, Mary. (2021). *Manajemen* (Edisi ke-13). Pearson.

Sasoko, D. M., & Mahrudi, I. (2022). *Teknik Analisis SWOT dalam Sebuah Perencanaan Kegiatan.* Universitas Jayabaya.

Semiawan, C. R. (2022). *Metode penelitian kualitatif*. Grasindo.

Sudirman, A., Muttaqin, M., Purba, R. A., Wirapraja, A., Abdillah, L.A., Fajrillah, F., … & Simarmata, J. (2020). *Sistem Informasi Manajemen*. Yayasan Kita Menulis.

Sugiyono. (2022). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D.* Bandung: Alfabeta.

Terry, G. R. (2020). *Prinsip-prinsip Manajemen.* Jakarta: Bumi Aksara.

Walujo, D. A., Koesdijati, T., & Utomo, Y. (2020). *Pengendalian Kualitas*. Scopindo Media Pustaka.

Journal

Dimas Ihza Mahendra, Pramudya Ramadhan, & Suseno. (2023). Penerapan Metode Statistical Quality Control (Sqc) Dalam Pengendalian Proses Produksi Roda Karet Pada Perusahaan Baja Makmur 2. *Jurnal Ilmiah Teknik Mesin, Elektro Dan Komputer*, *3*(3), 505–518. https://doi.org/10.51903/juritek.v3i3.2341

Meutia, S., Maulana, T., Bahri, S., Logistik, P. T., Teknik, F., Malikussaleh, U., Utara, A., Industri, P. T., Teknik, F., Malikussaleh, U., Utara, A., & Kualitas, P. (2024). *Goreng (Olein) Menggunakan Statistical Quality Control (Sqc) Di Pt . Industri*. *13*(1), 42–51.

Simarmata, M. H., Septiari, R.,& Studi Teknik IndustriS-,P. (2023). Upaya Pengendalian Kualitas Keripik Tempe Terhadap Produk Cacat Menggunakan Metode Statistical Quality Control (Sqc) Pada Home Industri Keripik Tempe Sari. *Jurnal Mahasiswa Industri Teknik, 6*(2), 220-227.

Surabaya, U. A. (2024). *Analisis Penerapan Statistical Quality Control (SQC) dalam Mengurangi Produk Cacat pada Bingkai Pigura di Bmrsign Wallgallery Lamongan yaitu dengan " Statistical Quality Control (SQC)". statistik . Metode yang dimanfaatkan dalam mengendalikan serta me*. *5*.

Yunitasari, E. W., & Wijya, F. S. (2021). Pengendalian Kualitas Produk Vitabumin 130 Ml Menggunakan Statistical Quality Control (Sqc) Di Pt. Aksamala Adi Andana. *Dinamika Teknik Industri, IV*(1), 1412–3339. https://www.unisbank.ac.id/ojs/index.php/ft1/article/view/8727

Wiwik Handayani, Hutama Muhammad Anhar. (2021). *Quality Control Of Written Batik CV. Batik Tulis Al Huda With Statistical Quality Control (SQC) Method.* Jurnal Ekonomi. 17(2), 292-294.

Septiani, R. (2023). *Analisis Pengendalian Kualitas Produksi Kain Batik Dengan Menggunakan Metode Statistical Quality Control (SQC) Pada Kareumbi Gallery Batik & Bordir Subang*. Jurnal Manajemen, 12(1), 1–10.

Indrawati, S. (2020). *Pengendalian Kualitas Produk Batik Menggunakan Metode Statistical Quality Control (SQC) di Batik Sasambo "Jaya Abadi" Lombok Timur*. Jurnal Ilmiah Rinjani, 3(1), 30–42.

Paramitha, A. R. (2022). *Analisis Pengendalian Kualitas Produk Kain Batik Tulis Menggunakan Metode Statistical Quality Control*. Skripsi, UPN Veteran Jakarta.

Laili, U. N. (2022). *Penerapan Metode SQC dan FMEA Untuk Pengendalian Kualitas Produk Batik Lasem*. Skripsi, Universitas Islam Sultan Agung.

Septiani, R. (2023). *Analisis Pengendalian Kualitas Produksi Kain Batik Dengan Menggunakan Metode Statistical Quality Control (SQC) Pada CV Batik Tulis Al Huda*. Jurnal Manajemen, 12(1), 1–10.

Wijayanti, A. (2020). *Pengendalian Kualitas Produk Batik Dengan Menggunakan Metode Statistical Quality Control*. Jurnal Industri Kreatif dan Kewirausahaan, 2(2), 55–65.

Susanti, R. (2021). *Pengendalian Kualitas Produk Kain Batik di PT Batik Bengawan Indah Surakarta Dengan Metode Statistical Quality Control*. Skripsi, Universitas Sebelas Maret.

Fauziah, D. (2021). *Penerapan Metode Statistical Quality Control dan Six Sigma Dalam Pengendalian Kualitas Produk Batik*. Prosiding Seminar Nasional Sains dan Teknologi, 8(1), 80–87.

Putri, A. (2023). *Penerapan Peta Kendali C-Chart Dalam Pengendalian Kualitas Produk Batik di PT*

Danar Hadi Pabelan. Skripsi, Universitas Teknologi Yogyakarta.

Article

Kementerian Perindustrian. Menperin: PMI Manufaktur Juni 2023 Naik tinggi, Tapi Industri Tekstil Masih Menderita. Tersedia: https://bbt.kemenperin.go.id/blog/konten-55

Website

Databoks.(2023) Pertumbuhan penduduk Indonesia. Tersedia: https://databoks.katadata.co.id/datapublish/2023/07/13/penduduk-indonesia-tembus-278-juta-jiwa-hingga pertengahan-2023.