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Analysis Of Quality Control Effectiveness Through Quality Standardization Audits As A Measure To Address Product Non-Conformance (Case Study At Pt. X)

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ABSTRACT

Objective: *This study examines quality control effectiveness at PT. X upper production line, where non-conformance rates remain high, primarily due to recurring missing felt cases that cause shoes to fall below thickness standards.* ***Method:*** *Using a qualitative approach (in-depth interviews and direct observation with QC team, supervisor, and operator).* ***Results:*** *The study finds that audit procedures are structured yet operator compliance is situational. Three root causes are identified: excessive production targets, limited operator awareness of work-step consequences, and a QC-operator quality perception gap. CAPA actions are executed but lack verification mechanisms, allowing recurring defects.* ***Novelty:*** *Quality improvement demands transformed audit practices, closed CAPA cycles, and quality-driven incentive systems.*

INTRODUCTION

The global footwear manufacturing industry faces intense competitive pressure, requiring companies to produce high-quality products while maintaining cost efficiency. This situation has encouraged manufacturers to adopt international standards such as ISO 9001 as the foundation for implementing a Quality Management System (QMS). Within this framework, standardization audits, whether conducted internally or externally, play a critical role as quality control instruments to ensure that quality management systems operate in accordance with established requirements. Audits serve as preventive mechanisms for identifying potential non-conformities at an early stage, thereby minimizing their impact on product quality and customer satisfaction.

However, the implementation of standardization audits in Indonesia continues to encounter various challenges. The gap between international standards and local implementation capacity remains a fundamental issue. Although many Indonesian manufacturing companies have obtained ISO 9001 certification, the practical implementation of these standards still faces considerable obstacles. The discrepancy between international standard requirements and local implementation capabilities has become a major challenge affecting the effectiveness of quality management systems [1]. Limited internal auditor competence, weak integration of audit findings into corrective and preventive actions, and the tendency to regard audits merely as compliance activities rather than strategic quality improvement tools reduce their overall effectiveness.

Previous studies have shown that audit quality control systems positively influence audit quality; however, implementation gaps remain evident in practice. Quality control is a crucial element in maintaining consistency in manufacturing product quality [2], while effective internal audits function as an essential mechanism for identifying deviations before they affect the quality of final products [3].

The high rate of defective products in the manufacturing industry indicates weaknesses in quality control systems. Previous studies have demonstrated that the timely identification and segregation of non-conforming products can prevent further losses and protect a company's reputation among customers [4]. A clear discrepancy remains between documented quality standards and their practical implementation. Many companies, particularly in developing countries, continue to experience difficulties translating international standards into effective operational practices. Previous research has reported that product non-conformities frequently result in increased quality costs, including scrap, rework, and declining brand reputation [5]. As part of a global footwear manufacturer with certified quality management systems, PT X faces similar challenges. Effective production planning and process control contribute to improved product quality by providing clear production workflows and process organization [6]. Nevertheless, the continued occurrence of non-conforming products suggests deficiencies in quality control mechanisms, raising questions regarding the extent to which standardization audits function effectively as preventive and corrective quality management instruments.

Footwear products consist of two major components: the upper, which encloses the foot, and the bottom, including the outsole. These two components are manufactured on separate production lines before being assembled into a finished product. This study focuses specifically on the upper production line because non-conformance rates remain relatively high, particularly due to missing felt components that are frequently omitted during production.

Technically, the upper production process begins after the leather material has completed the cutting stage, during which it is cut into predetermined pattern pieces. The materials are then transferred to the upper department for further processing.

In this production line, the first operator plays a critical role by ensuring that all upper components and cut pieces are complete before the product proceeds to the next workstation. Subsequently, each operator performs specific tasks according to the established division of labor. One of the critical stages in this process is the felt installation, which is carried out after the stiffener has been attached. If the responsible operator skips this step—either due to pressure to meet production targets or the assumption that the missing component will not be detected—the product should ideally be returned by the subsequent operator for completion before proceeding to the next operation.

However, in practice, the defect is often identified only during the quality inspection stage, when the shoe thickness fails to meet the required standard. At that point, the completed upper must be returned from the sole assembly line to the upper department for rework, resulting in additional time and resource consumption that could have been prevented through earlier process control. To examine this production pattern more systematically, this study adopts Statistical Process Control (SPC) as a conceptual framework for understanding how quality control is implemented throughout the production process. In this research, SPC is not employed as a statistical analysis tool or for quantitative data processing. Instead, it is used as a conceptual approach that emphasizes the importance of structured and continuous process monitoring and control. Product non-conformities are therefore interpreted as indicators of inadequately controlled production processes, inconsistent implementation of standard operating procedures, and weak follow-up mechanisms for addressing process deviations. Within this framework, quality standardization audits are positioned as quality control instruments that evaluate the conformity of operational practices with established standards while identifying weaknesses in quality control mechanisms. Accordingly, this study aims to analyze the role of standardization audits in strengthening quality control systems, identify the factors contributing to product non-conformities, examine how such defects are addressed, and evaluate the company's efforts to prevent the recurrence of non-conforming products in the operational practices of PT X.

This study focuses on the implementation of quality standardization audits and the procedures used to manage products that deviate from established quality standards. Standardization audits are viewed as a quality assurance system encompassing the preparation stage, on-site audit implementation, and the follow-up process, particularly in identifying and resolving quality-related issues. The analysis further examines how audit findings are addressed through the implementation of Corrective and Preventive Action (CAPA) and evaluates the contribution of audit activities to strengthening process control mechanisms.

Meanwhile, the management of non-conforming products refers to the complete sequence of actions undertaken when a product fails to meet predetermined specifications. The first step involves identifying and segregating defective products to prevent them from being mixed with conforming products. The second step focuses on investigating the root causes of the non-conformities to determine the underlying factors contributing to the deviations. Finally, both corrective and preventive actions are implemented, including responsive measures to rectify defective products and proactive measures designed to prevent similar non-conformities from recurring.

The significance of this study lies in the need for an in-depth evaluation of the role of quality standardization audits as a quality control mechanism within the operational activities of PT X, particularly in assessing the extent to which audit implementation leads to meaningful operational improvements. Although quality audits are conducted routinely, they have not completely eliminated non-conforming products in the upper

production line, particularly recurring missing felt defects that result in insufficient shoe thickness. This situation indicates that the existing quality control system has not yet been implemented optimally. Therefore, this study focuses on examining the existing quality control mechanisms, identifying the root causes of product non-conformities, evaluating the company's responses to audit findings, and assessing preventive measures aimed at avoiding the recurrence of similar quality issues, with emphasis placed on process analysis and audit follow-up effectiveness rather than statistical or quantitative analysis.

Managing products that fail to meet quality standards requires strategies that not only resolve existing problems but also prevent their recurrence. In this regard, Corrective and Preventive Action (CAPA) plays a crucial role in achieving continuous quality improvement. Consistent implementation of CAPA can reduce the recurrence of product defects, particularly when supported by comprehensive root cause analysis and strong organizational commitment to implementing corrective actions. In practice, CAPA serves as the link between audit findings and corrective actions implemented within the production area. Nevertheless, its implementation often encounters practical challenges arising from discrepancies between planned corrective actions and actual execution, especially when operators must balance the pressure to achieve production targets with the need to maintain quality standards. Accordingly, this study considers CAPA as one of its primary analytical focuses to examine the effectiveness of corrective and preventive action mechanisms at PT X and to identify the factors influencing their successful implementation.

For PT X, this study is expected to identify weaknesses in the audit process, thereby enabling the company to formulate more effective improvement strategies. From an academic perspective, this study is highly relevant given the increasing intensity of global competition and the growing demand for product quality improvement, which depends not only on technical procedures but also on the effectiveness of organizational quality control practices.

Several previous studies have reported findings relevant to this research. Strict production process control has been identified as an effective preventive strategy for minimizing product non-conformities. Real-time monitoring of critical process parameters enables early detection of deviations before they result in large numbers of defective products [7]. Companies employ various approaches to maintain product quality, one of which is the implementation of Statistical Quality Control (SQC) as a quality control tool [8]. Quality control is generally defined as a systematic method for regulating and managing product quality by ensuring that quality standards are maintained throughout the entire production process—from the initial production stage, through manufacturing operations, to the final product [9]. Consequently, quality control plays a decisive role in determining the quality of products delivered to customers. It is also recognized as a problem-solving approach used to monitor, regulate, analyze, manage, and continuously improve products manufactured by a company. Statistical Quality Control (SQC) is specifically designed to maintain production quality standards

and regulate manufacturing and service processes through statistical methods [10]. Previous studies have further demonstrated that effective production process control is essential for maintaining and improving product quality [11]. Other researchers found that standardization audits contribute to reducing product defects through cause-and-effect analysis while reinforcing the importance of production process control in maintaining product quality [12]. Likewise, the implementation of Statistical Quality Control (SQC) enables companies to identify process variations that may result in defective products, allowing corrective actions to be implemented before problems escalate [13]. Furthermore, studies on product quality control have shown that integrating audit findings with corrective actions in production processes can significantly reduce product defect rates [7]. Accordingly, a systematic approach to managing non-conformities is considered fundamental to the success of continuous quality improvement programs.

Nevertheless, a clear research gap remains. Most previous studies, including those conducted by Rifki et al. [6], Kurnia et al. [9], and Athariq et al. [14], have adopted quantitative approaches emphasizing numerical outcomes, such as defect rates and defect percentages. Limited research has examined how standardization audits are implemented to address product non-conformities, why these mechanisms sometimes fail to operate effectively in practice, and which factors moderate the relationship between standardization audits and non-conformance management. In particular, the social dimensions of the audit process—including the perspectives of auditors, production supervisors, and operators, as well as the interaction dynamics among these stakeholders—remain largely unexplored. Research on standardization audits and quality control within the Indonesian footwear industry is also relatively scarce. Existing studies predominantly focus on the food, pharmaceutical, and automotive industries, whereas the footwear industry presents unique production characteristics involving complex manufacturing processes and diverse defect types, including detached soles, torn uppers, uneven stitching, and inconsistent adhesive application [15]. Footwear manufacturing is characterized by high operational complexity, encompassing multiple production stages such as material cutting, upper stitching, sole assembly, and finishing, each with distinct quality risks and requiring specific operator competencies. Previous studies on defect analysis in manufacturing have identified human-related factors—including operator negligence, inadequate training, non-compliance with standard operating procedures (SOPs), and insufficient attention to detail—as major contributors to product non-conformities [16].

Accordingly, this study focuses on examining the implementation of standardization audits, the mechanisms used to manage product non-conformities, the interaction between these two aspects, and the factors that either facilitate or hinder their effectiveness. Corrective and Preventive Action (CAPA) constitutes a key element of quality management systems for addressing product non-conformities. CAPA emphasizes not only corrective actions for existing defects but also preventive measures

aimed at eliminating the root causes of recurring problems [17]. Furthermore, studies investigating the perception gap between auditors and production operators regarding audit findings and the urgency of corrective actions remain extremely limited [18]. Production operators frequently face the dilemma of balancing production targets with compliance to quality standards; however, their perspectives have received insufficient attention in studies on standardization audits. Therefore, this study aims to identify the supporting and inhibiting factors affecting the control of product non-conformance levels within the operational environment of PT X.

METHODOLOGY

This study employed a qualitative approach using a case study design. According to Sugiyono, qualitative research is based on the philosophy of post-positivism and is used to investigate phenomena within their natural settings [19]. Fundamentally, qualitative research seeks to understand social phenomena from the perspectives of individuals who are directly involved, rather than measuring or statistically testing relationships between variables. This approach was selected because the research questions—how quality control is implemented in practice and why product non-conformities continue to occur—cannot be comprehensively explained through numerical data alone. Instead, they require an in-depth understanding of operational dynamics within the production environment.

Research Site and Period

This study was conducted at PT X, a footwear manufacturing company serving international markets. PT X was selected because it is a global-scale footwear manufacturer that places strong emphasis on product quality and implements rigorous quality standards. The research focused on the upper production department, where relatively high levels of product non-conformance continue to occur, particularly missing felt defects that result in shoe thickness falling below the required specifications. The study was conducted from January to February 2026.

Data Sources

The primary data for this qualitative study were collected through in-depth interviews and direct observation. Semi-structured interviews were conducted with individuals directly involved in the company's quality control process, including members of the Quality Control (QC) team and production supervisors (SPVs).

Data Collection Techniques

Data were collected using three qualitative techniques: (1) In-depth Interviews. Semi-structured interviews were conducted using open-ended interview guides. Each interview session lasted approximately 45–90 minutes, allowing participants to explain their experiences and perspectives in detail. (2) Direct Observation. The researcher

conducted field observations within the upper production area to directly examine how standardization audits were implemented, how production operators performed their tasks, and how interactions occurred among the QC team, production supervisors, and operators during daily operations. (3) Document Analysis. Relevant organizational documents were reviewed to enrich contextual understanding, including records of product non-conformities, work instructions, and Corrective and Preventive Action (CAPA) reports.

Data Analysis Technique

The data were analyzed using the interactive analysis model developed by Miles, Huberman, and Saldaña [20]. A distinctive feature of this model is its cyclical and iterative nature, allowing continuous interaction among data collection, data reduction, data presentation, and conclusion drawing throughout the research process. The analytical procedure consisted of the following stages:

Data Collection. Raw data were gathered through interviews, direct observations, and document analysis. All interviews were audio-recorded and transcribed verbatim, while field observations were documented systematically. At this stage, the data remained unprocessed and had not yet been categorized.

Data Condensation. The collected data were subsequently selected, organized, simplified, and refined. This process included: (a) coding each segment of data according to relevant themes; (b) grouping data into the four principal research dimensions, namely audit implementation, non-conformance findings, CAPA mechanisms, and supporting and inhibiting factors; (c) removing irrelevant information; and (d) identifying significant quotations representing the perspectives of each participant group. NVivo software was employed as a qualitative data management tool to facilitate coding and thematic categorization rather than performing statistical analyses.

Data Display. The condensed data were presented in the form of descriptive narratives, thematic tables, and NVivo-generated word cloud visualizations. The presentation was designed to illustrate relationships among emerging themes and the perspectives of different participant groups in a systematic and coherent manner.

Conclusion Drawing and Verification. Conclusions were developed progressively throughout the research process. Initial interpretations remained provisional and were continuously verified through data triangulation, which involved comparing information obtained from three participant groups—the QC team, production supervisors, and production operators—to ensure the consistency and credibility of the findings. Methodological triangulation was also conducted by comparing evidence derived from interviews, observations, and documentary analysis. Final conclusions were established only after consistent evidence had been obtained from multiple data sources.

The entire analytical process was conducted iteratively, with the researcher moving continuously between data condensation, data display, and conclusion verification until data saturation was achieved, that is, the point at which additional data no longer generated new themes or provided substantively meaningful insights.

RESULT AND DISCUSSION

Results

The interview data collected in this study are presented in four thematic categories corresponding to the research objectives: the implementation of quality standardization audits, audit findings and product non-conformities, Corrective and Preventive Action (CAPA) mechanisms, and factors influencing the effectiveness of quality control. Data were gathered through structured interviews with three groups of informants—the Quality Control (QC) team, Production Supervisors (SPVs), and Production Operators—between January and February 2026 at the production facilities of PT X.

Implementation of Quality Standardization Audits

This aspect aimed to examine how quality standardization audits are conducted in practice, from the preparation stage through follow-up activities. Particular attention was given to audit frequency, inspection priorities, and the challenges encountered during implementation. The three groups of informants provided complementary perspectives on the audit process.

The Quality Control team described the audit procedure as follows:

"The audit team usually inspects the operators' work processes from the first operation to the last and compares each process with the work instructions to ensure compliance. The quality of the products produced by each operator is also evaluated. The production line selected for the audit is generally chosen randomly. Whenever non-conformities are identified, the auditors immediately determine where the deviation occurred and investigate its root cause." (HI, QC Team, interview, February 1, 2026, 15:10–16:00 WIB)

Regarding the audit focus, the QC representative emphasized that the primary concern is ensuring operators' compliance with work instructions and verifying product thickness standards:

"The inspection mainly focuses on whether operators perform their work according to the work instructions and whether the resulting products meet quality standards. Every operator's work is checked to ensure that no production step has been omitted or added. Shoe thickness is measured using a thickness gauge, and each product must meet the specified thickness standard. Therefore, if the felt component is missing, the shoe thickness will not meet the required specification." (HI, QC Team, interview, February 1, 2026, 15:10–16:00 WIB)

Quality audits are routinely conducted every Thursday, although the schedule may occasionally be postponed due to operational priorities. From the Production

Supervisor's perspective, compliance with standard operating procedures is monitored by measuring both thickness and substance.

"We usually check the product using thickness and substance measurements. If the felt is not installed, the substance becomes too thin." (NA, Production Supervisor, interview, February 6, 2026, 18:00–19:10 WIB)

The most frequently reported challenge in audit implementation was behavioral rather than technical. The QC informant identified operators' inconsistent compliance as the primary obstacle:

"During the audit, operators generally follow the work instructions. However, once the auditors leave, some operators tend to return to their previous habits, causing recurring problems. Therefore, the real challenge is the commitment and awareness of everyone involved. Not only operators, but also springers, supervisors, and the QC team must remain committed to maintaining quality consistently." (HI, QC Team, interview, February 1, 2026, 15:10–16:00 WIB)

Overall, the findings indicate that the standardization audit procedures at PT X are well structured, including systematic verification of operators' work sequences, compliance with work instructions, and product thickness measurement using standardized equipment. Audit activities are scheduled regularly, and production lines are selected randomly. Nevertheless, all participant groups consistently acknowledged that operators' compliance often depends on the presence of auditors. Once supervision decreases, previous work habits frequently re-emerge. These findings suggest that the primary issue lies not in the audit procedures themselves but in the insufficient internalization of quality values among employees at all organizational levels, from production operators to supervisory personnel.

Audit Findings and Product Non-Conformities

This section explores the types of non-conformities identified during quality audits, with particular emphasis on missing felt, which emerged as the most critical recurring issue. In addition to documenting the various forms of non-conformities, the interviews investigated participants' perspectives regarding the underlying causes of these recurring defects.

According to the QC representative, the most common non-conformities identified in the upper production department include color inconsistencies, uneven collar height, improperly trimmed threads, and stitching defects. Although missing felt occurs relatively infrequently, its consequences are considered significant:

"Missing felt is actually quite rare. However, the cases that have occurred have made us realize that even a very small component should never be underestimated." (HI, QC Team, interview, February 1, 2026, 15:10–16:00 WIB)

The QC team identified three primary causes of missing felt: deviations from the production process specified on the showboard, errors originating from previous production departments, and operator negligence. Meanwhile, the Production

Supervisor emphasized excessive workload and insufficient responsibility among operators:

"Heavy workloads and a lack of responsibility sometimes cause operators to underestimate the importance of the felt component, assuming that skipping it will not create any problems." (NA, Production Supervisor, interview, February 6, 2026, 18:00–19:10 WIB)

The production operator provided a more detailed explanation regarding the function of the felt component and the consequences of omitting it:

"The felt is basically used to increase the shoe thickness so that pinching does not occur during sole assembly." (F, Production Operator, interview, January 30, 2026, 10:00–10:45 WIB)

The operator openly acknowledged that production targets frequently encourage operators to skip the felt installation process:

"Because production targets are very high and the conveyor moves quickly to speed up production, operators sometimes reduce operations by skipping the felt installation. Since the felt is small, many assume that it is insignificant and will not be detected if omitted." (F, Production Operator, interview, January 30, 2026, 10:00–10:45 WIB)

The operator also admitted experiencing psychological pressure resulting from demanding production targets:

"Yes, I feel pressured by the production targets, so sometimes I unintentionally neglect quality in order to achieve the required output." (F, Production Operator, interview, January 30, 2026, 10:00–10:45 WIB)

The Production Supervisor confirmed that this conflict between production quantity and product quality also exists at the supervisory level:

"Large production targets sometimes place considerable pressure on operators, creating a dilemma between achieving production targets and maintaining product quality. Ideally, both objectives should be achieved simultaneously through discipline, cooperation, awareness, and commitment among operators, supervisors, and the QC team." (NA, Production Supervisor, interview, February 6, 2026, 18:00–19:10 WIB)

Collectively, the three groups of informants demonstrate that missing felt cannot be explained from a single perspective. The QC team primarily attributes the problem to procedural deviations, errors from previous production stages, and insufficient operator accuracy. Production supervisors emphasize excessive workloads and limited operator responsibility, whereas production operators describe the practical realities of balancing high production targets with strict quality requirements. These combined perspectives reveal substantial structural pressure within the production environment, where operators work closest to the source of the problem but possess limited flexibility to maintain quality without sacrificing production efficiency.

Corrective and Preventive Action (CAPA) Mechanism

This section investigates the company's response once defective products are identified, including the personnel involved, the corrective actions implemented, and the effectiveness of these measures in preventing similar problems from recurring. Following the identification of a non-conforming product, the first corrective action involves classifying the defect according to its severity (minor or major). According to the QC representative, defective products are returned to the responsible operator for correction. When more than three defective pairs are identified, supervisors and technicians jointly conduct a root cause analysis. All documented findings are subsequently entered into the company's quality management system as references for future production of similar product models.

Preventive measures include providing additional attention to product models with previous quality issues:

"We review all issues recorded in the system whenever that particular shoe model enters production again. Missing felt became a major issue for the Soft Seven model, so when the same article is produced again, special attention is given to prevent recurrence. All supervisors are instructed to ensure that missing felt does not occur in any production article." (HI, QC Team, interview, February 1, 2026, 15:10–16:00 WIB)

From the Production Supervisor's perspective, preventive actions are monitored continuously rather than only at the beginning of each shift:

"Supervisors inspect every operator at the beginning of each shift change to prevent missing operations. If these inspections are conducted properly, the number of non-conformities can be reduced. However, inspections are performed not only at the beginning of shifts but also randomly throughout the production process." (NA, Production Supervisor, interview, February 6, 2026, 18:00–19:10 WIB)

According to the QC representative, the greatest challenge in implementing CAPA is not the absence of procedures but rather human behavior and organizational commitment:

"The biggest challenges are operator awareness, understanding, discipline, and the commitment of both supervisors and operators to continuously improve product quality. Operators often neglect procedures because they fear work accumulation or cannot keep up with conveyor speed, while supervisors sometimes prioritize production quantity over quality." (HI, QC Team, interview, February 1, 2026, 15:10–16:00 WIB)

From the operator's perspective, effective corrective actions should be practical and supportive rather than creating additional operational burdens:

"Operators need more detailed training, and whenever problems occur, they should be resolved in practical and relevant ways. Each operator handles hundreds of shoe uppers during a single shift, so problem-solving approaches should make the work easier rather than more difficult. Operators' suggestions and concerns should also be taken seriously." (F, Production Operator, interview, January 30, 2026, 10:00–10:45 WIB)

Procedurally, PT X has established a comprehensive mechanism for handling product non-conformities. Defective products are first classified according to defect severity, followed by collaborative root cause analysis involving supervisors and technicians. Audit findings are systematically documented to support future preventive measures, while supervisors perform routine inspections throughout production rather than limiting monitoring to shift changes. Despite these structured procedures, an important limitation emerged from the interviews. None of the informants described a formal mechanism for evaluating whether implemented corrective actions actually resulted in sustained improvements over time. Instead, all participant groups consistently identified the same underlying issue: the primary challenge lies not in the quality management system itself but in human behavior. Operators' awareness, discipline, responsibility, and long-term commitment remain the decisive factors influencing CAPA effectiveness. Unless these behavioral dimensions are addressed more systematically, corrective actions are likely to resolve only the immediate symptoms of quality problems without eliminating their underlying causes.

Supporting and Inhibiting Factors Affecting the Effectiveness of Quality Control

This section compiles the perspectives of the three groups of informants regarding the conditions that facilitate or hinder the consistent implementation of quality control. The resulting framework of factors is not merely a list but reflects the actual dynamics experienced daily by personnel working directly on the production line. From the perspective of supporting factors, informants from all three groups agreed that initial training, the availability of work instructions, cross-functional communication, and awareness of export quality requirements provide a solid foundation for quality assurance. An operator with more than ten years of experience explained that the existing training system is adequate, with orientation beginning on the first day of employment:

"Quality standard training is usually provided during the initial workplace orientation for new employees. We are introduced to how work is carried out at PT. X, where every operation is supported by a work instruction to help operators perform their assigned tasks." (F, Production Operator, interview, January 30, 2026, 10:00–10:45 AM)

Amid the production pressure, an interesting phenomenon emerged: operators often looked out for one another. When an operator at one workstation missed installing the felt component, the operator at the next station frequently noticed the omission before the product progressed further down the line. This practice is not part of any formal procedure, nor is it explicitly required by company policy. Nevertheless, in practice, this informal peer monitoring helped prevent several defective products from advancing to subsequent production stages. Unfortunately, such informal mechanisms were not strong enough to offset the greater and more consistent pressure imposed by production targets. The production supervisor acknowledged that, ideally, quality and productivity should not be viewed as conflicting objectives; however, in reality, production pressure often takes precedence:

"Sometimes this does happen. However, fundamentally, if quality is achieved, production targets will also be achieved. When SOPs are properly followed, quality issues are minimized, and production flow targets become much easier to accomplish." (NA, Production Supervisor, interview, February 6, 2026, 6:00–7:10 PM)

The operator further recommended that production targets should be reviewed to ensure they are realistic and aligned with actual working conditions on the production line:

"Perhaps the production targets should be reviewed again to determine whether they are truly realistic. Although targets have already been evaluated, discrepancies still occur. Line targets should be aligned with work-study results. Production targets should not be set excessively high so that operators can be more attentive to product quality." (F, Production Operator, interview, January 30, 2026, 10:00–10:45 AM)

Based on the information collected, two opposing groups of factors influence quality performance in the upper production line. On one hand, several positive conditions have been established. Quality orientation is provided from the first day of employment, every workstation is equipped with accessible work instructions, communication among teams functions effectively, audits are conducted regularly, and awareness that the products are destined for export markets strengthens employees' sense of responsibility.

On the other hand, daily production targets remain the most significant obstacle. Operators constantly face the dilemma of either completing hundreds of shoe uppers correctly or pursuing production quotas. This situation is further aggravated by a reward system that primarily emphasizes production volume, providing little incentive for employees who prioritize accuracy and product quality. Overall, the fundamental quality management infrastructure is already in place; however, unresolved structural pressures continue to undermine the consistency of its implementation.

When the perspectives of the three groups of informants are compared, a highly consistent pattern emerges. The persistence of non-conformance is not caused by poorly designed systems or inadequate procedures. Rather, the underlying issue lies in the gap between documented procedures and their actual implementation on the production floor. This gap is exacerbated by high production pressure and by the absence of a systematic mechanism to verify whether implemented corrective actions have effectively eliminated the root causes of quality problems.

Discussion

To support the analysis of the four dimensions discussed in this section, the results of the NVivo word cloud analysis are presented together with an interpretation of the dominant keywords extracted from the interview data. This visualization illustrates the most frequently occurring words that are directly related to the main themes of the study.

Figure 1. NVivo Word Cloud

This discussion section presents a critical interpretation and analysis of the findings reported in the Results section. Each aspect is examined in depth by relating the empirical evidence to the principles of Statistical Process Control (SPC) and relevant findings from previous studies. This integrative approach provides a more comprehensive understanding of why the identified conditions occur and highlights their implications for the effectiveness of quality control practices at PT. X.

Table 1. Interpretation of Dominant Keywords in the NVivo Word Cloud

Keyword	Category	Meaning in the Research Context	Supporting NVivo Keywords
Operator	Production Actor	The most frequently mentioned stakeholder; operator behavior and compliance are the primary determinants of non-conformance.	negligence, omission, careless, error
Product / Production	Process Output	The final focus of quality control; products must comply with specifications before leaving the production line.	defect, standard, upper, shoe
Felt	Critical Component	The component most frequently associated with defects; missing felt in the upper section represents the dominant audit finding.	missing, thickness, installation, stiffener
Audit	Control Mechanism	The primary instrument for detecting deviations; its effectiveness depends heavily on consistent implementation.	findings, form, review, evaluation
Quality Standard	/ Quality Parameter	The benchmark applied throughout every inspection cycle and the reference point for all production personnel.	standardization, procedure, specification

Keyword	Category	Meaning in the Research Context	Supporting NVivo Keywords
Work Instruction	/ Operational Procedure	The most apparent weakness; a considerable gap remains between written instructions and operators' actual daily practices.	SOP, supervisor, implementation, operation
Corrective Preventive	/ Follow-up Action	Indicates that CAPA has been implemented but remains incomplete, particularly regarding verification of corrective action effectiveness.	corrective action, implementation, consistency
Training Communication	/ Supporting Factor	Distinguishes consistently compliant operators from those who are not; effective communication accelerates problem resolution.	teamwork, commitment, awareness
Target / Shift Pressure	/ Inhibiting Factor	Represents the daily production pressure experienced by operators, creating conflict between production speed and work accuracy.	dilemma, obstacle, dependency

Source: Processed by the authors.

The NVivo word cloud analysis presented in Figure 1 and Table 1 visually and quantitatively reinforces the interview findings. Among the nine dominant keywords identified, three—operator, felt, and target/pressure—appeared with the highest frequencies and formed the central themes of this study. The keyword operator, accompanied by related terms such as negligence, omission, and carelessness, indicates that individual behavior on the production line is the most influential factor contributing to product non-conformance. Meanwhile, the keyword felt, closely associated with missing and thickness, confirms that this component is not merely a minor technical detail but rather the most vulnerable critical point under conditions of high production pressure. Furthermore, the prominence of target and pressure, together with related terms such as dilemma and obstacle, reflects the structural tension experienced daily by operators as they balance production quantity with product quality. The distribution of these keywords is not random; instead, it represents a hierarchy of issues that is consistent with the interview findings and provides the foundation for the analysis of the four discussion themes presented in the following sections.

Implementation of Quality Standardization Audits

When assessed solely from a procedural perspective, the quality audit practices at PT. X have fulfilled the minimum requirements of a structured control system. Standardized inspection instruments are in place, audits are conducted on a weekly basis, and a clear reporting mechanism exists from the Quality Control (QC) team to the production supervisor. However, the effectiveness of a quality management system cannot be assessed merely by its administrative completeness. Field observations revealed a much deeper issue: operator compliance reached its highest level only when auditors were physically present and quickly returned to previous patterns once the auditors moved to another production area.

The findings are more concerning than the simple issue of a few undisciplined employees. Compliance that occurs only under direct supervision is not merely an individual behavioral problem but rather a symptom of a systemic issue. This indicates that, despite the continuous implementation of audit activities, the importance of maintaining product quality has not yet been fully internalized into the mindset of production personnel. This finding supports previous research demonstrating that quality culture serves as a critical moderating factor determining whether Total Quality Management (TQM) can significantly improve operational performance [21]. Organizations that implement quality procedures without fostering a comprehensive quality culture across all organizational levels generally experience limited improvements in operational performance. Accordingly, the findings of this study suggest that the shortcomings of the audit system at PT. X extend beyond technical implementation issues and reflect the absence of a well-established quality culture, where work standards function as shared organizational values rather than merely rules followed during supervisory inspections.

The NVivo analysis further reinforces this interpretation. Although the term audit appeared with high frequency, it was consistently associated with words such as evaluation, forms, and reviewed, rather than understanding, awareness, or commitment. This pattern was not coincidental but reflected how participants genuinely perceived audits as external activities that had to be accommodated rather than as opportunities for self-reflection and continuous quality improvement. A similar pattern emerged for the terms work and instruction, which were closely associated with implementation and Standard Operating Procedures (SOPs) instead of understanding or belief. These linguistic patterns indicate a substantial gap between complying with standards and understanding their underlying purpose. Unless this gap is addressed, increasing the frequency of audits alone is unlikely to produce sustainable behavioral change. Previous Lean Six Sigma-based quality control research similarly concluded that the most effective improvement strategy is to refine existing SOPs rather than create entirely new procedures [22]. This finding supports the argument that the existing audit procedures and work standards at PT. X are fundamentally adequate. The primary challenge lies in ensuring that these procedures remain effective under actual production pressures and

in systematically designing mechanisms that guarantee consistent SOP compliance beyond periods of direct supervision.

The findings also align with previous studies showing that continuous monitoring systems generate meaningful improvements only when the work environment enables employees to report problems openly without fear of negative consequences [5]. At PT. X, however, the audit process remains predominantly one-directional, flowing from the QC team to production operators, with limited opportunities for operators to communicate the practical challenges they encounter during production. When audits are perceived merely as inspections conducted by authority figures rather than collaborative opportunities to identify and solve operational problems, their impact is confined to the duration of the auditors' presence. Consequently, the primary issue is not how frequently audits are conducted but how constructive relationships between auditors and operators are established.

Research applying Statistical Process Control (SPC) in footwear manufacturing [23], together with findings from another footwear production study [24], reached a similar conclusion: process quality is determined not by the existence of audit procedures but by the consistency of production practices over time. Furthermore, another study [25] reported that production processes could remain outside statistical control limits despite routine audits, indicating that periodic inspections alone are insufficient without daily self-monitoring mechanisms implemented at every workstation. Therefore, the most urgent improvement for PT. X is to incorporate operator self-verification into standard operating procedures while redefining the auditor's role from a mere inspector to a facilitator of continuous improvement.

Ultimately, the primary issue is not the incompleteness of audit procedures but the gap between formal compliance and the genuine internalization of quality values. Audit procedures have been established, inspection schedules are consistently implemented, and measurement instruments are appropriately utilized. Nevertheless, operator compliance is driven more by external supervision than by an authentic understanding of the importance of quality control. From a quality management perspective, this reflects a failure to internalize organizational quality values. In other words, work standards are followed because employees are being monitored rather than because they recognize their intrinsic importance. This distinction is critical, as compliance based solely on supervision persists only while external control mechanisms remain active. Consequently, increasing audit frequency without fundamentally changing the auditing approach is unlikely to produce lasting behavioral improvements on the production line.

Audit Findings and Non-Conforming Products

Using the conceptual framework of Statistical Process Control (SPC) as the analytical lens, the recurring missing felt defects identified in the upper production line at PT. X can be classified as a special cause variation, referring to deviations that do not occur randomly but are triggered by specific, identifiable, and correctable factors. This

classification is crucial because it determines the type of corrective action required. If process variation is random, improvement efforts should focus on the overall production system. However, when the source of variation is specific, as observed in this case, corrective actions must directly target the underlying root causes.

The NVivo analysis provides quantitative evidence supporting this layered causal structure. The term felt emerged as one of the most frequently occurring words, closely associated with missing, installation, and stiffener, indicating that this component occupies a central position in participants' discussions regarding product quality. Simultaneously, the terms target and pressure, categorized as inhibiting factors, were consistently linked with dilemma and obstacles, suggesting that production pressure is not merely a contextual condition but an active variable perceived as the primary driver of non-conforming products. The convergence between the dominant occurrence of the terms target and felt throughout the interviews strengthens the argument that missing felt defects are primarily the result of structural production pressures rather than isolated instances of operator negligence.

Cross-analysis of data obtained from the three participant groups revealed a multilayered pattern of causation. At the outermost level, excessive production targets encourage operators to consciously adopt shortcuts by omitting the installation of felt components to keep pace with conveyor speed. Recent manufacturing research applying the DMAIC approach [26] similarly identified human factors as the most consistent cause of product non-conformities, alongside material and machine-related issues. The study emphasized that quality improvement initiatives focusing exclusively on technical aspects of machinery and materials are unlikely to succeed without identifying the underlying behavioral factors contributing to process deviations. This situation closely reflects the operational conditions observed at PT. X. Likewise, research on manufacturing quality control has shown that defects and process waste can generally be traced to discrepancies between documented work procedures and their actual implementation on the production floor [27].

Visual problem-solving techniques, particularly fishbone diagram analysis involving direct operator participation, have also proven to be more effective than unilateral analyses conducted solely by management. For PT. X, actively engaging operators in identifying the root causes of *missing felt* defects is likely to produce improvement strategies that are both practical and better aligned with actual production conditions. Consistent with this perspective, fishbone-based analyses have demonstrated that worker carelessness rarely occurs independently but is almost always associated with working conditions that fail to support accuracy and consistency [28]. Therefore, the missing felt phenomenon at PT. X should be understood within a broader structural context that enables such omissions to occur rather than being attributed solely to individual errors. Furthermore, studies have shown that interventions combining technical improvements with operator training achieve substantially greater reductions in defect rates than technical improvements alone [29]. This principle is highly relevant

to PT. X, where resolving the recurring *missing felt* issue requires two complementary approaches: improving structural conditions, including the establishment of realistic production targets, and strengthening operators' understanding of the importance of every production step.

Beyond these structural factors lies a deeper issue related to operator understanding. Although operators are familiar with the required procedures, they do not fully appreciate why omitting a seemingly minor component can significantly affect the quality and performance of the final product. At an even deeper level, a difference in quality perception exists between the Quality Control (QC) team and production operators. While QC personnel evaluate quality based on complete compliance with product specifications, operators tend to assess quality primarily by whether the product passes the inspection process. This discrepancy in perspective silently sustains the conditions under which non-conforming products continue to occur.

Previous research in the footwear industry [15] reinforces this argument by demonstrating that operator deviations from established work standards generally originate from an inadequate understanding of the consequences associated with skipping individual production steps. Other studies have further reported that production speed pressures consistently encourage workers to simplify work procedures, even when those procedures are technically indispensable [30]. In addition, another study [31] identified workload imbalances among production stations as an underlying factor that intensifies this tendency. Collectively, these findings indicate that improvement efforts should extend beyond stricter supervision. More fundamental interventions are required, including establishing realistic production targets, implementing training programs that explain not only procedural requirements but also the consequences of non-compliance, and fostering communication capable of bridging differing perspectives among stakeholders involved in the production process.

The recurring missing felt defects on the production line cannot be adequately explained solely as a technical problem. Field analysis identified three interrelated factors contributing simultaneously to the occurrence of non-conforming products. First, excessive production targets encourage operators to intentionally simplify work procedures by omitting critical process steps. Second, limited operator understanding of the downstream consequences resulting from the omission of the felt component leads to an underestimation of the severity of such errors. Third, differences in quality perception between the QC team and production operators create inconsistent standards regarding acceptable product quality. These three factors reinforce one another and therefore cannot be effectively addressed through isolated interventions. Increasing supervisory activities alone, without addressing these underlying causes, is likely to alter only the manifestation of the problem rather than eliminate its source. This finding is fully consistent with the concept of special cause variation within the Statistical Process Control (SPC) framework, which emphasizes that sustainable quality improvement

requires identifying and eliminating the specific causes of process variation rather than merely strengthening external control mechanisms.

CAPA (Corrective and Preventive Action) Mechanism

A notable issue identified in the implementation of the Corrective and Preventive Action (CAPA) system at PT. X is that corrective measures have not been carried through to completion. Although corrective actions such as product rework and operator retraining are routinely implemented, no formal mechanism exists to verify whether these actions effectively eliminate the root causes of product defects. Consequently, each improvement cycle addresses only the visible symptoms rather than the underlying causes of quality problems. As a result, similar non-conformities continue to recur in different cases, suggesting that lessons learned from previous incidents have not been fully institutionalized.

These findings indicate significant shortcomings in the CAPA process at PT. X. A more robust mechanism is required to ensure that the underlying causes of product defects are effectively identified, corrected, and prevented from recurring. Such improvements would enable the company to minimize repeated quality failures and achieve more sustainable improvements in product quality.

The relevance of these findings is further supported by the NVivo analysis. The terms corrective and preventive appeared as prominent follow-up clusters in the word cloud, accompanied by words such as improvement, implementation, and consistency. However, notably absent were terms such as verification, confirmation, or other expressions indicating evaluation of effectiveness. This linguistic pattern suggests that participants primarily perceived CAPA as a series of corrective activities rather than as a complete improvement cycle requiring formal verification of outcomes. This interpretation is consistent with field observations, where CAPA was generally understood as the execution of corrective actions instead of a systematic process that concludes only after the effectiveness of those actions has been confirmed.

The effectiveness of CAPA depends on two essential factors: the accuracy of root cause identification and the consistent implementation of corrective actions through to the verification stage [17]. Without both elements, corrective actions become merely temporary responses to recurring problems. This interpretation is reinforced by previous findings [32], which demonstrated that, in the absence of a clear target of zero recurrence, similar defects are likely to reappear. Likewise, even the most comprehensive quality control system cannot produce meaningful improvements without sustained commitment from all levels of management [33]. At PT. X, the tendency of supervisors to prioritize production quantity over product quality reflects the absence of a strong normative commitment to quality values [34]. Consequently, CAPA activities rarely progress to the verification stage required to confirm the effectiveness of implemented improvements. Normative commitment itself can be strengthened through the internalization of organizational quality values and by fostering greater employee

responsibility. An effective quality management system requires a CAPA process capable of ensuring that similar deviations do not recur; therefore, the verification stage should never be omitted [35]. To improve the current condition, three actions are recommended. First, establish clear and measurable performance indicators for every corrective action. Second, schedule formal verification activities after an appropriate implementation period to evaluate the effectiveness of corrective measures. Third, actively involve production operators in root cause analysis to ensure that proposed solutions are practical, realistic, and applicable under actual production conditions.

Overall, the evaluation of CAPA implementation at PT. X demonstrates that the primary weakness does not lie in the absence of corrective actions but rather in the failure to complete the improvement process through systematic verification. Corrective measures—including product rework, revisions to work instructions, and operator retraining—have already been implemented. However, no formal mechanism exists to verify that the underlying causes of non-conformities have been permanently eliminated. Consequently, similar quality problems remain likely to recur because the conditions responsible for those defects have never been confirmed to have changed. Within the Statistical Process Control (SPC) framework, this indicates that improvement efforts address only the observable symptoms while the underlying special causes of process variation remain active. Therefore, a critical priority for PT. X is to establish measurable success indicators for every CAPA cycle. Such an approach would ensure that corrective actions generate structural and sustainable improvements rather than merely administrative compliance or temporary solutions.

Supporting and Inhibiting Factors

The field findings do not present a simple dichotomy between strengths and weaknesses. On one hand, PT. X possesses several conditions that provide a solid foundation for an effective quality management system. On the other hand, persistent operational pressures gradually undermine the effectiveness of these positive conditions. These supporting and inhibiting factors do not operate independently; rather, they continuously interact within the dynamic production environment.

This contrast is also reflected in the distribution of keywords generated through the NVivo word cloud analysis. Terms such as training and communication, which were categorized as supporting factors, were closely associated with collaboration, commitment, and awareness, highlighting the elements that strengthen the company's quality management foundation. Conversely, terms such as target, shift, and pressure, categorized as inhibiting factors, were strongly linked with dilemma and obstacles, indicating that production pressure is perceived as working against quality assurance efforts. Notably, the frequency of the inhibiting-factor clusters exceeded that of the supporting-factor clusters throughout the interview corpus. This suggests that production constraints are experienced more intensely and discussed more frequently than the conditions supporting quality improvement. These findings reinforce the

argument that although the procedural foundations of the quality management system are already established, structural pressures exert a more dominant influence on operator behavior within the production line.

Table 2. Supporting and Inhibiting Factors.

No.	Supporting Factors	Inhibiting Factors
1	Initial training provided during employee orientation helps operators understand quality standards from their first day of work.	High daily production targets encourage some operators to prioritize speed over work accuracy.
2	Open communication among the QC team, supervisors, and operators accelerates the resolution of quality issues identified on the production floor.	High employee turnover hinders the consistent transfer of quality standards and operational knowledge.
3	Regular audit schedules gradually foster more disciplined work practices throughout the production line.	Some operators continue to perceive audits as supervisory inspections rather than opportunities for continuous improvement.
4	The availability of work instructions and visual display boards at every workstation enables operators to verify their work more effectively.	CAPA follow-up activities lack clearly defined success indicators, increasing the likelihood of recurring quality problems.
5	Awareness that the products are intended for export markets strengthens operators' sense of responsibility for maintaining quality.	Reward systems based solely on production volume provide little incentive for operators who prioritize product quality over production speed.

Source: *Processed by the authors.*

Table 2 demonstrates that PT. X already possesses many of the essential resources required to operate an effective quality management system. Initial training is provided, work instructions are available at every workstation, communication among production teams is well established, audits are conducted regularly, and awareness of export-market quality requirements encourages greater employee responsibility. Such organizational resources are not universally available across manufacturing companies. Nevertheless, previous research has emphasized that the existence of written procedures does not automatically translate into compliance. Unless operators fully understand the consequences that omitted production steps have on product quality and customer satisfaction, work instructions remain merely documents displayed on the production floor rather than practical guidance influencing decisions during ongoing production activities [24].

Conversely, previous studies have emphasized that production target pressure cannot be resolved simply by increasing supervision or tightening operational procedures [36]. Production pressure is fundamentally a structural variable requiring changes in how organizations establish performance targets and evaluate employee performance. Furthermore, empirical evidence demonstrates that well-designed reward systems significantly improve employee performance, with average productivity increases of approximately 15% compared to employees who do not receive performance-based incentives [37]. These findings provide a strong empirical basis for recommending revisions to the reward system at PT. X. As long as employee rewards are determined solely by production volume without considering work quality, operators have little intrinsic motivation to prioritize accuracy over speed. Consequently, implementing a reward system that explicitly recognizes quality performance, rather than production quantity alone, represents one of the company's most urgent improvement priorities.

Previous research has also demonstrated that turnover intention and the actual consequences of high employee turnover significantly reduce operational productivity in manufacturing environments [38]. Newly recruited employees require substantial adaptation time before mastering established work standards, while experienced employees take valuable knowledge and practical expertise with them when they leave the organization. These findings provide strong empirical support for identifying high employee turnover as one of the primary barriers to maintaining consistent quality control at PT. X. Similarly, other studies have concluded that continuous employee turnover makes defect reduction difficult because each new employee requires time to fully understand and consistently apply established production standards [39]. Collectively, these barriers generate a reinforcing cycle that weakens quality performance. A reward system focused exclusively on production quantity provides little incentive for operators to reduce production speed in favor of greater accuracy, while the absence of systematic verification mechanisms prevents the organization from determining whether implemented corrective actions have effectively resolved recurring quality problems.

When these four dimensions are examined collectively, a clear cyclical pattern emerges. Audits that fail to influence operator behavior inevitably lead to recurring quality problems. These recurring problems subsequently trigger CAPA implementation. However, because no formal verification confirms that the root causes have been eliminated, the same problems continue to recur. At the same time, persistent structural pressures ensure that operators remain in working conditions where production shortcuts continue to appear reasonable. Breaking this cycle requires more than isolated improvements. Instead, simultaneous organizational changes are necessary. Audits must evolve from inspection-oriented activities into collaborative learning processes, while CAPA systems must incorporate measurable verification mechanisms to ensure that corrective actions genuinely eliminate the underlying causes

of non-conformities. Without these complementary improvements, the substantial resources invested in quality audits and quality management procedures are unlikely to produce sustainable improvements in production performance.

CONCLUSION

Fundamental Finding: PT. X has implemented a structured quality audit system through standardized checklists, direct workplace inspections, and regular Corrective and Preventive Action (CAPA) activities. The findings further reveal that the most frequent non-conformance, missing felt, is caused not only by technical factors but also by organizational issues, including demanding production targets, repetitive work routines, high employee turnover, and limited operator awareness of the consequences of minor errors. **Implication:** The findings suggest that improving quality control requires not only effective inspection procedures but also stronger organizational support. Reinforcing quality-oriented leadership, clear work instructions, transparent communication, routine audits, and export market requirements can enhance the sustainability of quality performance. **Limitation:** Although CAPA activities, including corrective actions, work procedure revisions, and retraining, have been implemented, the process frequently ends before the verification stage. As a result, there is no assurance that the identified root causes have been completely eliminated. **Future Research:** Future research should examine integrated technical and organizational strategies to address unrealistic production targets, employee turnover, and operator quality awareness, and evaluate their long-term effectiveness in reducing non-conformance and improving audit performance.

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