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Product Quality Risk Analysis in the Production Process of Swa Brand Bottled Drinking Water at PT Swabina Gatra

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Abstract:

Product quality is a crucial factor in the bottled drinking water industry because it is directly related to consumer health and trust. Uncontrolled production processes have the potential to create various risks that can reduce the quality of the final product. This study aims to analyze product quality risks in the production process of Swa brand bottled drinking water (AMDK) at PT Swabina Gatra. The study used a qualitative approach with a case study type, which allows researchers to understand the real conditions in the field in depth. Data collection techniques were carried out through direct observation of the production process, in-depth interviews with management and production operators, and documentation studies related to standard operating procedures and quality control. The results of the study indicate that product quality risks arise at several production stages, such as raw water treatment, filtration processes, equipment sanitation, packaging, and storage of finished products. Factors causing these risks include limited supervision, compliance with operational procedures, equipment conditions, and human resource factors. This study emphasizes the importance of implementing quality risk management systematically and continuously to minimize the potential for product defects and maintain consistent bottled drinking water quality. The research findings are expected to provide evaluation material and recommendations for companies in improving quality control systems and ensuring product safety for consumers.

Keywords: risk analysis, product quality, production process, bottled drinking water.

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Introduction

The bottled drinking water (AMDK) industry is required to produce safe, consistent, and quality-compliant products. However, in practice, there is still a risk of product quality degradation during the production process. Theoretically, the implementation of quality risk management such as HACCP, GMP, and ISO 22000 can minimize the potential for defects and contamination (Issue et al., 2023). However, the

effectiveness of this theory is highly dependent on operational conditions, employee discipline, and process control in the field. Social facts show that several bottled drinking water (AMDK) companies still face consumer complaints regarding taste, odor, turbidity, and packaging inconsistencies, despite adhering to applicable quality standards (Sari et al., 2024). This indicates a gap between the theoretical concept of quality control and its actual implementation in the production line. This gap between theory and reality raises crucial issues regarding how, why, and at what stage quality risks arise. Therefore, a more systematic and contextual risk analysis is needed in the bottled drinking water production process, particularly for the SWA brand at PT Swabina Gatra (Pradita & Novidahlia, 2025). Various previous studies have discussed quality control and risk in the bottled water industry and the food industry in general. These studies generally used a quantitative approach.Failure Mode and Effect Analysis (FMEA), Hazard Analysis and Critical Control Point(HACCP), as well asStatistical Quality Control(SQC) to identify potential production process failures (Nusran & Ahmad, 2024). Previous research has shown that quality risks often arise during the raw water treatment, filtration, sterilization, and packaging stages. However, most studies have focused on large-scale companies or on specific technical aspects without comprehensively linking the production processes (Magang et al., 2023). Furthermore, there is limited research examining quality risks based on specific company and brand characteristics. Therefore, this study is positioned as an extension of previous research, namely by analyzing product quality risks comprehensively at all stages of the SWA brand AMDK production process at PT Swabina Gatra, thereby providing a more contextual and applicable picture (Gatra, 2022).

This study offers a novel approach to quality risk analysis that is specific, integrated, and based on real-world company conditions. Unlike previous studies, which tended to be general in nature, this study focuses on a single bottled water brand and a single company entity, allowing for more in-depth and accurate identification of quality risks (Akhir et al., 2022). The research's novelty lies in mapping quality risks at every stage of the production process, from raw water treatment and production, packaging, to storage, taking into account human factors, machines, methods, materials, and the work environment. Furthermore, this study links the results of the risk analysis with realistic quality improvement implications within the capacity of PT Swabina Gatra. With this novelty, this study is expected to provide a scientific contribution in the form of a quality risk analysis model that can be replicated or developed in similar bottled water industries, as well as providing practical value for companies in improving product quality consistency (Kasus et al., 2022).

The main objective of this study is to examine and address issues related to product quality risks in the production process of SWA brand bottled water. Without a clear understanding of the sources and levels of risk, quality control efforts tend to be reactive and ineffective. Therefore, this study is designed in the form of research questions (research questions). The questions asked include: (1) What quality risks arise at each stage of the SWA brand AMDK production process at PT Swabina Gatra? (2) What are the most dominant factors causing these quality risks? (3) What is the level of quality risk faced based on probability and its impact on product quality? (4) What control efforts are most appropriate to minimize product quality risks? By formulating research objectives in the form of questions, this research is expected to be able to produce a systematic, directed, and relevant analysis of AMDK product quality problems at PT Swabina Gatra (Gatra, 2025).

This research is based on the argument that the quality risks of bottled drinking water (AMDK) products can be identified, measured, and controlled through proper risk analysis. Each stage of the production process has a different potential for failure, and the greatest risks are suspected to arise in processes involving direct interaction between humans, machines, and the production environment. The preliminary argument of this research states that the quality risks of SWA brand bottled drinking water products at PT Swabina Gatra are influenced by inconsistencies in operational procedures, limited process supervision, and potential contamination during the processing and packaging stages. By implementing quality risk analysis, dominant risks can be prioritized for improvement. This argument will be tested through research to prove that quality risk analysis can be a basis for management decision-making in improving product quality, reducing the potential for defects, and strengthening the competitiveness of SWA brand bottled drinking water in the market (Husrani et al., 2023).

Methods

The This study uses a qualitative approach with a descriptive case study method, which aims to understand in-depth product quality risks in the production process of SWA brand bottled drinking water (AMDK) at PT Swabina Gatra (Wardiyanto et al., 2025). The qualitative approach was chosen because this study does not aim to test hypotheses statistically, but rather to explore the phenomena, processes, and causal factors of quality risks that occur in the field. The analysis was conducted using a cause-and-effect diagram (fishbone) to identify and categorize sources of quality risk based on human, machine, method, material, and environmental factors. PT Swabina Gatra was chosen as the research location because it is a producer of bottled water under the SWA brand, which has a sustainable production process and demands high quality standards. Furthermore, the potential for quality risks in the production process makes this company relevant as a case study object for in-depth analysis (Afif & Wahyunita, 2021).

Data collection techniques in this study were conducted through interviews, observation, and documentation. Semi-structured interviews were conducted with key informants, such as management, production managers, and production operators, to obtain information regarding the production process, quality control procedures, and potential risks. Direct observations were made during the production process of SWA brand bottled water to observe the workflow, equipment conditions, implementation of standard operating procedures, and the production environment (Santyaningtyas et al., 2025). Documentation techniques were used to supplement the research data through the collection of company documents, such as:standard operating procedures(SOP), product quality reports, production records, and quality inspection data. The combination of these three techniques aims to improve data accuracy through triangulation of sources and methods.

Data analysis in this study was conducted using the interactive analysis model from Miles and Huberman, which includes three main stages: data reduction, data presentation, and conclusion drawing (Spradley & Huberman, 2024). Data reduction was carried out by selecting, focusing, and simplifying data from interviews, observations, and documentation relevant to product quality risks. Furthermore, data presentation was carried out in the form of descriptive narratives and fishbone diagrams to facilitate understanding of the relationships between causes of quality risks (Barik et al., 2022). The final stage was conclusion drawing and verification, namely interpreting the research findings to determine the dominant quality risk factors in the SWA brand

AMDK production process at PT Swabina Gatra. This analysis process was carried out repeatedly until valid and scientifically accountable conclusions were obtained (Annisa, 2022).

Results

Based on direct observations in the PT Swabina Gatra production area, the SWA brand AMDK production process consists of several main stages: raw water treatment, filtration, sterilization, filling, packaging, and storage of finished products. Observation data shows that the production flow is linear and separated between wet and dry areas to minimize the risk of contamination. Filtration and filling machines operate semi-automatically, while some activities still involve human labor, such as machine supervision and secondary packaging. The production environment appears clean and enclosed, although during peak production hours, increased operator activity is found, potentially affecting the consistency of work procedures. From these observations, it can be interpreted that the characteristics of the production process at PT Swabina Gatra have followed the basic principles of industrial hygiene and sanitation of AMDK (Tubagus & Aprilianto, 2024). However, the significant human involvement at several stages indicates a potential quality risk if not balanced with consistent supervision and compliance with standard operating procedures.

Interviews with the production manager, head of quality control, and several production operators provided a more in-depth overview of the characteristics of the bottled water production process at PT Swabina Gatra. The informants explained that the production process adheres to the company's internal standards, aligned with national bottled water regulations. Raw water treatment involves multiple layers of filtration and sterilization to ensure product safety. However, interview data revealed that the main challenge in the production process is maintaining consistent implementation of standard operating procedures (SOPs), especially when production targets increase. Several operators acknowledged that time pressure can impact accuracy in machine monitoring and work area cleanliness (Mahraini et al., 2025). Interpretation of this data indicates that while the production system is conceptually well designed, human resources remain a crucial element influencing product quality. Thus, the characteristics of the production process are determined not only by the technology used but also by the behavior and work discipline of employees in the field.

Documentation obtained from PT Swabina Gatra includes standard operating procedures (SOPs), production process flowcharts, quality inspection records, and daily production reports. The SOP documents demonstrate that each stage of SWA brand bottled water production has clear work guidelines, from raw water receipt to finished product distribution. Quality inspection records demonstrate routine inspections of physical parameters, such as bottle clarity, packaging, and cleanliness. Furthermore, daily production reports record production volumes and the results of periodic quality inspections. Based on this documentation, it can be concluded that PT Swabina Gatra has an administration and record-keeping system that supports production process control. However, the alignment between these documents and field practices still requires ongoing evaluation (Wafik & Rinuastuti, 2024). This documentation reinforces the findings of observations and interviews that the characteristics of the production process have been standardized, but its implementation is still influenced by daily operational conditions.

Based on observations, interviews, and documentation, the researchers assessed that the characteristics of the bottled water production process at PT Swabina Gatra are structured and adhere to the principles of food industry quality control. The production

process has been designed to minimize quality risks through area separation, the use of filtration and sterilization machines, and theimplementation of well-documented standard operating procedures (SOPs). However, the researchers' analysis indicates that potential quality risks can still arise due to human factors, particularly at the supervision and packaging stages. The interaction between operators and machines is a critical point that requires special attention. Furthermore, production pressure and workload variations have the potential to affect the consistency of procedure implementation. Therefore, the characteristics of the production process at PT Swabina Gatra reflect not only technical aspects but also organizational dynamics and human resources. These findings provide an important basis for further quality risk analysis, as they demonstrate that improving the quality of bottled water products depends not only on technology but also on strengthening the company's quality control system and culture (Kimia, 2022).

Identifying Product Quality Risks at Each Stage of the Production Process

Based on direct observations of the SWA brand bottled water production line at PT Swabina Gatra, product quality risks were found to arise at almost every stage of the production process. In the raw water treatment stage, identified risks include fluctuations in source water quality and potential filtration ineffectiveness if filter pressure and conditions are not optimal. In the sterilization and filling stages, quality risks relate to machine cleanliness, temperature stability, and the potential for cross-contamination due to operator interaction with the equipment. Observations of the packaging process indicate the risk of packaging defects, such as loose bottle caps and dented bottles, especially when machine speed is increased. From a storage perspective, quality risks are related to product layout and warehouse space conditions. Interpretation of these observational data indicates that quality risks stem not only from the technical aspects of the machines but also from limited supervision and compliance with work procedures. This confirms that each stage of the production process at PT Swabina Gatra has different and interrelated risk characteristics (Patradhiani et al., 2023).

Interviews with production management, quality control, and operators revealed diverse perceptions of product quality risks. Informants from the quality control department stated that the greatest risks often arise at the filling and packaging stage, as this is the final stage before the product is marketed. Production operators added that work fatigue and daily production targets can affect the accuracy of SOP implementation. Interview data also showed that despite training, understanding and implementation of procedures still differed among individuals. Furthermore, production managers acknowledged that limited time for machine maintenance can increase the potential for process failure. Interpretation of these findings suggests that product quality risks at PT Swabina Gatra are not solely driven by technical factors, but also by human and organizational factors. Interviews reinforce the observation that quality risks are multidimensional and require a comprehensive control approach, rather than focusing solely on a single production stage (Study et al., 2024).

The documentation analyzed in this study includes the production process SOP, quality inspection records, product nonconformity reports, and machine maintenance schedules at PT Swabina Gatra. The SOP documents identify critical points at each production stage that could potentially pose quality risks, such as water filtration parameters, machine cleanliness standards, and packaging specifications. The quality inspection records indicate that the majority of nonconformities occurred in packaging and work area cleanliness. Furthermore, the machine maintenance reports indicate that maintenance intervals were not fully consistent with the planned schedule. This documentation provides written evidence that the company has formally anticipated quality risks, but its implementation still faces operational challenges. Therefore, the

documentation findings support the findings of observations and interviews that quality risk identification at PT Swabina Gatra has been carried out administratively, but still requires strengthening at the implementation stage and ongoing monitoring (Scor & Pt, 2024).

Based on a synthesis of observational data, interviews, and documentation, the researchers concluded that the quality risks of bottled water products at PT Swabina Gatra are systemic and occur at every stage of the production process. These risks can be classified into human, machine, method, material, and environmental factors. The water treatment and packaging stages are the dominant risk points because they are directly related to the safety and final quality of the product. The researchers' analysis shows that although a quality control system is in place, its effectiveness is highly dependent on the consistency of SOP implementation and the quality of supervision. Furthermore, the interaction between production pressure and resource constraints has the potential to increase the probability of quality risks occurring. Therefore, identifying these quality risks serves as an important basis for further analysis, such as mapping risk priorities and formulating control strategies. These findings confirm that improving the quality of bottled water products at PT Swabina Gatra requires an integrated approach that simultaneously encompasses technical and managerial aspects (Manajemen et al., 2021).

Analysis of Factors Causing Quality Risk (*Man, Machine, Method, Material, Environment)*

Based on direct observations in the SWA brand bottled water production area at PT Swabina Gatra, various factors causing quality risks were identified, which can be classified into five main aspects: people, machines, methods, materials, and the environment. From the human aspect, observations revealed variations in operator accuracy in carrying out work procedures, particularly when production volumes increase. From the machine aspect, some production equipment operates continuously for long periods, potentially reducing performance if not balanced with optimal maintenance. The method aspect is evident in the implementation of SOPs, which are generally available, but under certain conditions, minor deviations in their implementation still occur. From the material side, the quality of packaging and supporting materials shows variations that could potentially affect the final product. Meanwhile, environmental factors include the temperature of the production room and the level of cleanliness of the work area. Interpretation of these observations indicates that quality risks at PT Swabina Gatra stem from a combination of various interacting factors, thus requiring an integrated control approach (Surya & Ririh, 2021).

The following company data table summarizes the Analysis of Quality Risk Factors (Man, Machine, Method, Material, Environment) based on the results of observations and interviews at PT Swabina Gatra.

Table 1. Analysis of Factors Causing Risks to the Quality of SWA Brand AMDK Products at PT Swabina Gatra

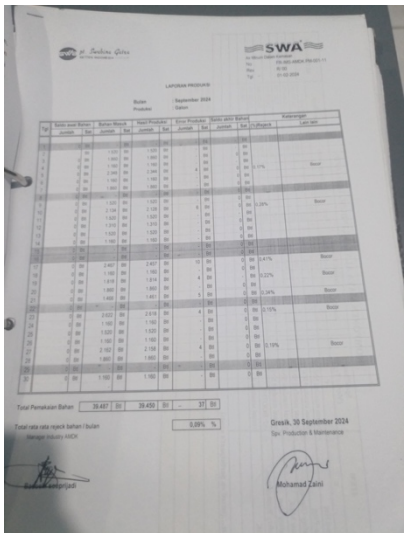
Factor Aspects	Observation Findings	Interview Results	Interpretation of Quality Risk
Man (Human)	Variations in th level of operato accuracy in carrying out wo procedures wer	Informants stated that differences i work experien and training	Quality risks arise due to human factors related to competence,

	found, especiall when the production loac increased.	levels affect th consistency c operator performance	accuracy, and consistency of work, so that increased training and supervision ar required.
Machine	Some productio machines operat continuously fo long durations without adequat breaks.	Managemen stated that limited production downtime wa the main obstacle in optimal machine maintenance	Quality risks ca potentially occu due to decrease machine performance, which can affec process stabilit and the quality the final produc
Method (Metode)	SOPs are availab and implemente but under certai conditions minc deviations are found in their implementatior	Informants assessed tha SOPs need to adjusted to dynamic production conditions.	Quality risks stem from inconsistencies the application work methods, periodic evaluation and adjustment of SOPs is require
Material	Variations in th quality of packaging and production support materia were found.	Quality contr staff stated th the quality o the bottles an packaging cap greatly determines th quality of the final product	Quality risks arise from inconsistencies materials, especially packaging, whic can affect product safety and appearanc
Environme	The temperatur conditions of th production roor and the level o cleanliness of th work area vary	Informants acknowledge that cleanline and comfort the work environmen influenced th quality of the production process.	Environmenta factors contribu to quality risks particularly tho related to the hygiene and stability of the AMDK production process.

Interviews with production managers, quality control staff, and operators provided a deeper understanding of the factors causing quality risks based on their work experiences. From the human aspect, informants stated that differences in experience background and training level affect the consistency of operator performance. Regarding

the machine aspect, management revealed that limited production downtime often hinders the implementation of comprehensive machine maintenance. The method aspect is related to the need to adjust SOPs to dynamic production conditions. From the material side, quality control informants stated that the quality of bottles and packaging caps significantly determines the quality of the final product. Environmental factors were also recognized as influential, particularly in maintaining the cleanliness and comfort of the production area. Interpretation of this interview data indicates that each factor causing quality risks plays a significant role, but human factors and work methods are the most frequently mentioned aspects. This confirms that quality control depends not only on technology, but also on human resource management and work processes (Ahmad et al., 2026).

Photo 1. Company data document 2024

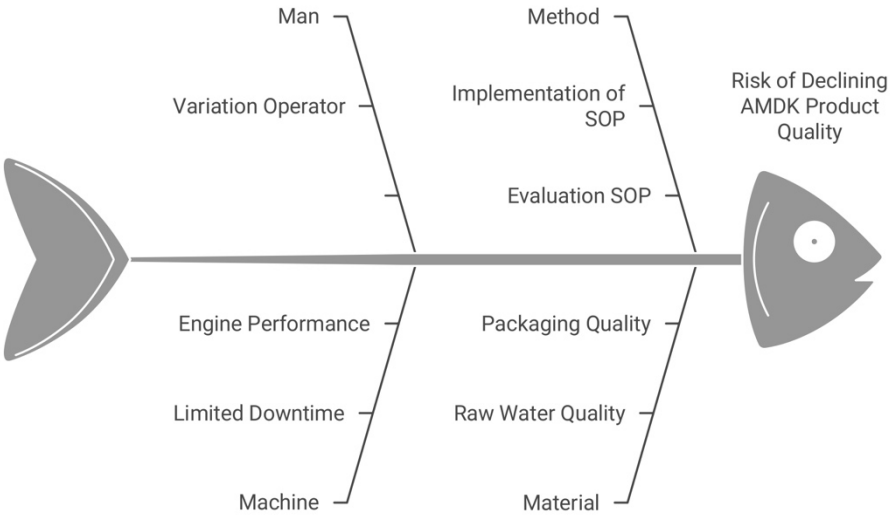


The documentation analyzed in this study includes production SOPs, employee training records, machine maintenance schedules, packaging material specifications, and a report on the environmental cleanliness audit at PT Swabina Gatra. The SOP document outlines operator responsibilities and work standards at each stage of production. Training records indicate that the company conducts routine training, but the frequency is limited to specific periods. The machine maintenance schedule demonstrates the existence of regular maintenance planning, although in practice, some adjustments are made due to production demands. Packaging material specifications indicate the quality standards that suppliers must meet. Furthermore, the environmental audit report emphasizes the importance of cleanliness and control of production room conditions. This documentation provides evidence that PT Swabina Gatra has a quality risk control support system in place, but its effectiveness depends heavily on consistent implementation and field supervision (Sejahterah et al., 2025).

Based on the integration of observation, interview, and documentation results, the researcher concluded that the factors causing quality risk at PT Swabina Gatra are multidimensional and interrelated. The human factor is a key element because it plays a direct role in machine operation and the implementation of work methods. Machine and material factors contribute as the main support for product quality, while methods and the environment function as control systems that maintain the stability of the production process. The researcher's analysis shows that quality risk will increase if one factor is not managed properly, even though other factors have met standards. Therefore, the fishbone approach that groups human, machine, method, material, and environmental

factors is very relevant to describe the complexity of quality risk in bottled water production. This finding provides an important basis for developing a more effective and sustainable risk control strategy, so that PT Swabina Gatra can improve the overall quality consistency of its SWA brand bottled water products (Artamonova et al., 2026).

Diagram 1 Fishbone Analysis of AMDK Product Quality Risks



Based on observations in the SWA brand bottled water productio at PT Swabina Gatra, quality control has been implemented at every stage of the p tion process, from raw water processing to finished product storage. Control is ed out through visual inspections, machine process monitoring, and maintaining ness in the production area. Observation data shows that operators routinely c initial checks before starting the machine and monitor it throughout the product ocess. However, under certain conditions, especially when production targets ase, the intensity of supervision appears to decrease. Furthermore, variations in the accuracy of work procedures between operators were found. Interpretation of these observational findings indicates that the quality control system at PT Swabina Gatra is operational, but not yet fully optimal. Routine controls still face challenges in terms of implementation consistency. This indicates that quality control requires strengthening, especially in the aspects of direct supervision and compliance with standard operating procedures to maintain the quality of bottled water products sustainably (Septiana et al., 2023).

Interviews with production management, quality control staff, and operators provide an overview of the company's quality control evaluation. Informants from the quality control department stated that the quality control system has been designed to detect deviations early, especially at the filling and packaging stages. However, operators revealed that time constraints and high workloads often hinder the optimal implementation of control. Management also acknowledged the need to improve the effectiveness of training and internal supervision. Interview data indicated that quality control at PT Swabina Gatra is conceptually understood, but its implementation is heavily influenced by human factors and operational conditions. Interpretation of these findings suggests that recommendations for quality improvement need to be directed not only at technical aspects, but also at strengthening human resource management,

internal communication, and quality culture to ensure more consistent quality control (Khaerunnisa et al., 2025).

The documentation analyzed in this study includes quality control SOPs, quality inspection reports, product nonconformity records, and follow-up corrective action documents at PT Swabina Gatra. The SOP documents demonstrate that the company has established quality control standards at every stage of the production process. The quality inspection reports noted minor findings related to packaging cleanliness and bottle closure conformity, which were then followed up with temporary corrections. However, follow-up documentation indicates that several improvement recommendations have not been systematically documented over the long term. This indicates that the quality control evaluation mechanism still focuses on short-term problem solving. This documentation reinforces observations and interviews that PT Swabina Gatra has a formal quality control system in place, but still requires improvements in terms of record-keeping, ongoing evaluation, and monitoring the effectiveness of corrective actions taken (Herlina et al., 2021).

Based on the integration of observation, interview, and documentation data, the researcher assessed that the quality control of bottled drinking water products at PT Swabina Gatra has been implemented, but its effectiveness can still be improved. The existing control system tends to be preventive and corrective, but is not fully proactive in preventing potential quality risks. The researcher's analysis shows that recommendations for quality improvement need to focus on strengthening process supervision, increasing the frequency of employee training, and consistent implementation of SOPs. In addition, a more structured quality control evaluation system is needed so that each finding can be followed up continuously. By implementing these recommendations, PT Swabina Gatra is expected to be able to reduce potential quality risks, increase the stability of the production process, and maintain consumer trust in SWA brand bottled drinking water products. These findings confirm that quality control evaluation is a strategic step in efforts to continuously improve product quality (Pradita & Novidahlia, 2025).

The findings of this study, which evaluates control and recommends improvements to the quality of bottled drinking water products at PT Swabina Gatra, align with previous studies emphasizing the importance of integrated quality control in the food and beverage industry. Previous research suggests that product quality risks generally stem from human factors, work methods, and inconsistent process oversight, even when companies have SOPs and quality control systems in place. These findings reinforce previous research suggesting that the existence of quality standards does not guarantee product quality if their implementation is not continuously monitored. Furthermore, several studies have shown that pressure from production targets and limited resources often contribute to the decline in the effectiveness of quality control. In the context of PT Swabina Gatra, this is reflected in the variation in the implementation of SOPs and controls, which are not optimal in certain situations. Therefore, these findings support the view of previous research that quality control needs to be supported by a strong management system and a consistent quality culture (Magang et al., 2023).

The results of this study not only confirm the findings of previous research but also provide a more specific empirical context for the company-scale bottled water industry, such as PT Swabina Gatra. Previous research has emphasized the importance of increased training, supervision, and continuous improvement as key strategies in quality control. The findings of this study demonstrate that these recommendations are relevant and applicable, particularly in strengthening the consistency of SOP implementation and quality control evaluation systems. Furthermore, this study expands on previous research by demonstrating that quality control evaluations need to be directed at long-term aspects, not just immediate problem-solving. Thus, this study contributes by

strengthening the evidence that effective quality control requires an integration of technical, human resource, and managerial aspects. The results of this study are expected to serve as a reference for further research and serve as a basis for continuous improvement of bottled water product quality in similar companies (Mahraini et al., 2025).

Conclusion

Based on the research results, it can be concluded that the characteristics of the SWA brand Bottled Drinking Water (AMDK) production process at PT Swabina Gatra have been systematically structured and follow the basic principles of food industry quality control. The production process includes raw water treatment, filtration, sterilization, filling, packaging, and storage of finished products, supported by standard operating procedures and a quality control system. However, this study identified product quality risks at every stage of the production process, both from technical and non-technical aspects. Analysis of the factors causing quality risks shows that human, machine, method, material, and environmental factors interact to influence the quality of the final product. Human factors and work methods are the dominant causes that have the potential to reduce quality consistency if not managed properly. The quality control evaluation shows that the control system has been implemented, but its effectiveness still faces obstacles in terms of consistency of implementation and supervision. Therefore, this study concludes that improving the quality of bottled drinking water products at PT Swabina Gatra requires strengthening integrated and sustainable process control (Sari et al., 2024).

This study has several limitations that require attention. First, the research was conducted using a qualitative case study approach in a single company, so the results cannot be generalized broadly to the entire bottled water industry. Second, limited time and data access led this study to place greater emphasis on the identification and analysis of quality risks, without conducting detailed quantitative measurements of risk levels. Furthermore, the data obtained relied heavily on observations and interviews, potentially influenced by informant subjectivity. Based on these limitations, further research is recommended to combine qualitative and quantitative approaches, for example by using the FMEA method or statistical analysis to determine quality risk priorities more measurably. Further research could also expand the study object to several bottled water companies for a more comprehensive comparison. For PT Swabina Gatra, it is recommended to strengthen its quality control system through increased employee training, more consistent process monitoring, and continuous evaluation of the effectiveness of implemented corrective actions (Pradita & Novidahlia, 2025).

Suggestion

The Based on the quality risk analysis of SWA brand bottled water products at PT Swabina Gatra, it is recommended that the company strengthen its quality control system in an integrated and sustainable manner, with a primary focus on human factors and work methods. The company needs to increase the frequency and quality of operator training, particularly regarding compliance with standard operating procedures (SOPs) and quality awareness, and tighten direct supervision at critical stages such as raw water processing, filling, and packaging. Furthermore, it is recommended to periodically evaluate and adjust SOPs to align with dynamic production conditions, along with more consistent machine maintenance planning to maintain stable equipment performance.

From a material and environmental perspective, the company needs to ensure consistent packaging material quality through supplier supervision and maintain optimal cleanliness and environmental conditions in the production process. By implementing these recommendations, PT Swabina Gatra is expected to minimize quality risks, improve product quality consistency, and maintain consumer trust in SWA brand bottled water.

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