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Assistance in Implementing Good Manufacturing Practices (GMP) to Improve Production Efficiency and Process Quality at AMDK Uyuna

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Abstract :
The bottled drinking water (AMDK) industry is required to produce safe, high-quality products that comply with food safety standards, and Good Manufacturing Practices (GMP) are a key means of achieving this. However, small- and medium-scale food producers often implement GMP inconsistently, with weak adherence to standard operating procedures (SOPs), incomplete production records, and limited worker knowledge of hygiene and sanitation. These problems were also found at AMDK UYUNA in Sukokerto Village, Pajarakan District, Probolinggo Regency. This community service program aimed to strengthen the partner's capacity to apply GMP principles to support production efficiency and process quality. A participatory action approach was carried out in four stages: baseline assessment, gap analysis against GMP principles, implementation assistance, and monitoring and evaluation, involving the management and 17 production workers. The results showed better worker understanding of GMP, more consistent SOP compliance, improved personal hygiene and sanitation in the production area, and more systematic production documentation. Productivity gains could not be measured quantitatively in the short term, but the findings suggest that GMP implementation can sustainably improve operational efficiency and process quality. The implementation-oriented assistance model may be replicated in other small- and medium-scale food industries.

INTRODUCTION

The bottled drinking water (AMDK) industry is a strategic subsector of the food industry that continues to grow as public demand for safe, hygienic, and high-quality drinking water increases (Amiza & Stiawan, 2025). Population growth, urbanization, changing consumption patterns, and rising public awareness of food safety have driven higher demand for AMDK products in Indonesia (Hartini, 2025; Basofitrah, 2025). Statistics Indonesia (BPS) shows that the manufacturing industry remains the largest contributor to national Gross Domestic Product (GDP), while the food and beverage subsector is one of the main pillars of growth in the national manufacturing sector (Agustin et al., 2026). This indicates that the food industry plays a strategic role in driving economic growth while strengthening national industrial competitiveness (Aqbar & Azwar, 2025). In line with this development, the Ministry of Industry has designated the food and beverage industry as a priority sector because of its significant contribution to manufacturing value added, investment, and employment (Sabyan & Herlin, 2025).

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Growing competition in the food industry, including the AMDK industry, requires every business actor not only to increase production capacity but also to produce safe, high-quality, and consistent products in accordance with food safety standards (Rojabi, 2025). Therefore, implementing an effective production management system has become essential for improving operational efficiency, ensuring product quality, and maintaining a company's competitiveness amid increasingly intense industrial competition (Ilham & Kulsaputro, 2025).

One internationally recognized approach to ensuring the safety and quality of food products is *Good Manufacturing Practices* (GMP), known in Indonesia as *Cara Produksi Pangan Olahan yang Baik* (CPPOB) (Maesaroh et al., 2025). GMP is a set of guidelines governing all aspects of the production process, including the suitability of buildings and facilities, environmental sanitation, equipment cleanliness, worker hygiene, process control, raw material storage, and documentation systems (Darmawan & Maryati, 2023). These principles refer to the *General Principles of Food Hygiene* issued by the Codex Alimentarius Commission as an international food safety standard, and they serve as a prerequisite program for implementing *Hazard Analysis and Critical Control Point* (HACCP) (Syahbanu, 2025). In Indonesia, GMP implementation is reinforced by regulations of the Indonesian Food and Drug Authority (BPOM) on CPPOB, which require every food business to apply a production system capable of ensuring product safety, quality, and consistency (Maesaroh et al., 2025). Accordingly, GMP implementation aims not only to minimize contamination risks but also to improve resource-use efficiency, reduce waste, strengthen quality control, and support business sustainability (Budaraga, 2026).

Although the benefits of GMP are widely recognized, its implementation remains a challenge for many micro, small, and medium enterprises (MSMEs) and developing food industries (Sayuti et al., 2026). Common obstacles include limited human resources, low understanding of good production standards, the absence of documented operating procedures, limited supporting facilities, and suboptimal supervision of the production process (Wijaya & Mahmud, 2025). These conditions can lead to inefficient production processes, a higher risk of product nonconformity, and reduced company competitiveness. Therefore, GMP implementation requires continuous assistance so that it can be applied effectively according to the characteristics of each business (Vania Marta, 2025).

These problems were also found at AMDK UYUNA, located in Sukokerto Village, Pajarakan District, Probolinggo Regency. Based on field observations and interviews with the management, the production process runs routinely, but the application of *Good Manufacturing Practices* (GMP) principles still needs strengthening in several aspects. The identification results show that production-area hygiene standards have not been comprehensively documented, *Standard Operating Procedures* (SOPs) have not been applied consistently at every production stage, and workers' understanding of good production practices still needs to be improved. In addition, the company has a production target of approximately 1,200 cartons per day, while actual production averages only 650–700 cartons per day. Production achievement therefore reaches only about 54–58% of the daily target, indicating inefficiencies in production process management that may be influenced by suboptimal GMP implementation.

This condition shows that there is still an opportunity to improve operational efficiency by strengthening the production management system, standardizing work

procedures, and increasing compliance with GMP principles. Consistent GMP implementation can create more systematic workflows, improve discipline in carrying out production procedures, strengthen quality control, and reduce waste of time, raw materials, and other resources (Riestu et al., 2026). Assistance is therefore a relevant strategy because it focuses not only on knowledge transfer but also on accompanying partners as they apply GMP principles directly under real field conditions (Kusumo et al., 2025).

Previous community service activities have generally focused on food safety counseling, hygiene and sanitation education, GMP training, and assistance in meeting product legality requirements (Firdaus et al., 2026; Basofitrah, et al., 2025). These programs have contributed to improving business actors' knowledge, but most remain oriented toward knowledge transfer through counseling or training. Approaches that integrate baseline assessment, gap analysis based on GMP principles, SOP development, direct implementation assistance in the production area, and evaluation of changes in work practices and operational efficiency remain relatively limited (Kusumo et al., 2025). A more comprehensive and implementation-oriented service model is therefore needed, one that not only improves partners' knowledge but also produces tangible and sustainable changes in production systems, quality control, and work culture (Hakiem et al., 2024).

Based on these conditions, the community service team carried out a program of Assistance in Implementing Good Manufacturing Practices (GMP) to Improve Production Efficiency and Process Quality at AMDK UYUNA. The program was carried out through baseline assessment, evaluation of the level of GMP compliance, formulation of improvement recommendations, GMP implementation assistance, worker education, and monitoring and evaluation of the results. The main contribution of this activity lies in developing an implementation-oriented assistance model that integrates baseline analysis, GMP-based technical recommendations, assistance in applying them at each stage of the production process, human resource capacity building, and evaluation of operational efficiency within a single continuous improvement cycle. This approach is expected not only to improve partners' understanding and skills in applying GMP but also to improve production practices, increase operational efficiency, and strengthen quality control, and to serve as a replicable service model for small- and medium-scale AMDK industries facing similar problems.

Based on the above, this community service activity aimed to improve the capacity of AMDK UYUNA to apply *Good Manufacturing Practices* (GMP) principles, improve the efficiency and quality of the production process, strengthen the quality control system, and support business sustainability through good food production practices that meet food safety standards.

RESEARCH METHOD

This community service activity was carried out at AMDK UYUNA, located in Sukokerto Village, Pajarakan District, Probolinggo Regency. The partner was selected based on an initial identification showing that its production process still needed strengthening in applying *Good Manufacturing Practices* (GMP), particularly in hygiene and sanitation, the application of *Standard Operating Procedures* (SOPs), production documentation, and human resource capacity. The activity used a participatory action

approach that positioned the partner as the main subject at every stage, so that all resulting recommendations could be applied sustainably in line with the company's operating conditions (Zunaidi, 2024).

The program involved the company's management and 17 workers directly engaged in AMDK UYUNA's production process as the main participants. All participants took an active part in problem identification, assistance activities, implementation of the recommendations, and evaluation of the results.

The first stage was baseline assessment. At this stage, direct observations were made of the production process, facility conditions, production flow, work-environment sanitation, equipment use, and workers' hygiene practices. In addition, semi-structured interviews were conducted with the management and workers to obtain information on the production system, operational constraints, production targets, and existing GMP implementation. The team then reviewed supporting documents available at the company, such as SOPs, production recording forms, and quality control documents. The identification results were used as the basis for determining the aspects requiring improvement.

The second stage was a gap analysis between existing conditions and GMP principles, referring to the *Cara Produksi Pangan Olahan yang Baik* (CPPOB) guidelines of BPOM (Athaya et al., 2026). The analysis used a GMP checklist covering buildings and facilities, production equipment, worker hygiene, sanitation, process control, storage of raw materials and finished products, documentation, and work-environment management (Surya, 2025). The results of the analysis became the basis for formulating technical recommendations tailored to the partner's needs and capacity.

The third stage was GMP implementation assistance. This included delivering material on GMP principles, demonstrating good production practices, developing and refining SOPs for the required production stages, assisting with personal hygiene practices, strengthening sanitation in the production area, and coaching on the importance of documenting and recording production activities. All activities were carried out participatively through discussion, hands-on practice, and assistance in the production area, so that workers could both understand and apply GMP principles in their daily operations.

The fourth stage was monitoring and evaluation of program implementation. Monitoring was conducted periodically throughout the activity to assess the extent to which the recommendations had been implemented. The evaluation compared conditions before and after the assistance based on field observations, the level of compliance with GMP indicators, changes in production workers' behavior, and improvements in participants' understanding, measured through evaluative discussions and assessment sheets. The evaluation also considered changes in production process efficiency, such as workflow regularity, SOP application, production-area cleanliness, and the consistency of procedure implementation.

Program success was determined by several indicators: improved workers' understanding of GMP principles, SOPs for production developed or improved according to the partner's needs, increased compliance with hygiene and sanitation practices, better implementation of production documentation, and improved GMP compliance in AMDK UYUNA's production process. The evaluation results were then used as the basis for follow-up recommendations so that GMP implementation can be maintained and developed sustainably.

Data obtained from observations, interviews, documentation, and the GMP checklist were analyzed using descriptive qualitative analysis through data reduction, data display, and conclusion drawing. The results were used to evaluate the level of GMP compliance before and after the assistance and to formulate improvement recommendations suited to the partner's operating conditions.

The method applied in this activity is summarized in four main stages: (1) baseline assessment, (2) gap analysis based on GMP principles, (3) implementation assistance and human resource capacity building, and (4) monitoring and evaluation of implementation results. This sequence is expected to bring about sustainable change in AMDK UYUNA's production system through more effective GMP implementation, thereby improving operational efficiency and production process quality.

RESULT AND DISCUSSION

Result

Baseline Assessment of *Good Manufacturing Practices* (GMP) Implementation

The activity began with a baseline assessment of the production process at AMDK UYUNA, located in Sukokerto Village, Pajarakan District, Probolinggo Regency. This stage aimed to describe the level of *Good Manufacturing Practices* (GMP) implementation as the basis for designing the assistance program. The assessment was carried out through direct observation of the production area, interviews with the management and workers, and review of available operational documents.

The assessment showed that the production process followed the company's operational flow, but several aspects did not yet fully meet GMP principles. The main findings were inconsistent application of *Standard Operating Procedures* (SOPs), simple production process documentation, and the need to improve workers' understanding of personal hygiene and production-area sanitation. In addition, the company has a production target of approximately **1,200 cartons per day**, while actual production averages **650–700 cartons per day**. This indicates an opportunity to improve operational efficiency through more systematic GMP implementation.

Table 1. Baseline Assessment Results for GMP Implementation

Aspect	Initial Condition	Recommendation
Production SOPs	Not applied consistently	Refinement and dissemination of SOPs
Personal hygiene	Still needs improvement	Hygiene practice education
Production-area sanitation	Not routinely documented	Development of a sanitation schedule
Production documentation	Still simple	Improvement of recording forms
Production efficiency	Target not achieved	GMP implementation assistance

Based on Table 1, most of the problems found were caused not by limited technology or machine capacity but by operational management, standardization of work procedures, and discipline in applying GMP principles. This indicates that production efficiency can be improved by optimizing the work system, strengthening SOP application, improving personal hygiene, upgrading production-area sanitation, and reinforcing documentation, without large investments in equipment. The program therefore focused on GMP implementation assistance tailored to the real needs and

operational capacity of AMDK UYUNA.



Figure 1. The service team with the management and workers of AMDK UYUNA during the baseline assessment and coordination of GMP assistance.

The baseline assessment was carried out participatively through discussions with the management and workers to understand the company's operating conditions and agree on improvement priorities (Figure 1). This approach aimed to build shared commitment so that every recommendation could be applied sustainably in line with company conditions.

Implementation of GMP Assistance

Based on the baseline assessment, the activity continued with assistance in implementing *Good Manufacturing Practices* (GMP). The assistance was carried out directly in the production area so that workers could understand how GMP principles apply under actual operating conditions. The material covered personal hygiene, work-environment sanitation, SOP application, production process control, documentation of production activities, and the importance of quality control as part of the food safety system.

In addition to delivering material, the service team held technical discussions with the management on the various constraints encountered during production. Each problem found was analyzed jointly to arrive at solutions suited to company conditions, so that the recommendations were easier to apply.



Figure 2. GMP assistance through observation of the production process and technical discussions with the partner in the AMDK UYUNA production area.

Direct assistance in the production area gave workers practical experience in applying GMP principles at every stage of the production process (Figure 2). This approach enabled two-way interaction, so participants could discuss operational constraints directly and obtain solutions that fit company conditions.

Outcomes of the Assistance

The assistance produced positive changes in the understanding and work practices of AMDK UYUNA's production workers. After the activity, workers showed better compliance with *Standard Operating Procedures* (SOPs), greater attention to personal hygiene, and more orderly sanitation and production documentation. These changes indicate that the assistance not only provided knowledge about *Good Manufacturing Practices* (GMP) principles but also encouraged their application in daily production activities.

Changes between the conditions before and after the assistance were most visible in GMP understanding, SOP application, personal hygiene, production-area sanitation, and production documentation. The management also began to pay more attention to process supervision and the recording of production activities. These findings show that the assistance was able to build awareness of the importance of applying consistent work procedures as part of quality control.

Table 2. Changes in Conditions Before and After the Assistance

Aspect	Before the Assistance	After the Assistance
GMP understanding	Limited	Improved
SOP application	Not consistent	More consistent
Personal hygiene	Not yet optimal	Better
Production-area sanitation	Not scheduled	Begun to be applied
Production documentation	Still simple	Better organized

Based on Table 2, the most visible changes were in workers' understanding of GMP, SOP application, personal hygiene, sanitation, and production documentation. These results show that assistance provided directly in the work environment can help

partners understand the relationship between work procedures, cleanliness, sanitation, and quality control.

Discussion

Implementation of *Good Manufacturing Practices* (GMP) at AMDK UYUNA

The results show that GMP implementation at AMDK UYUNA changed positively after the assistance. The baseline assessment showed that the production process ran routinely, but several GMP principles were not yet fully consistent. The problems were found mainly in *Standard Operating Procedure* (SOP) application, personal hygiene, production-area sanitation, and production process documentation. After direct assistance, workers began to show better understanding of and compliance with work procedures, hygiene practices, sanitation, and production recording. These findings suggest that GMP implementation problems at AMDK UYUNA relate not only to the availability of facilities but also to workers' understanding, habits, and consistency in carrying out procedures.

These changes show that participatory assistance plays an important role in helping workers understand GMP within their daily work context. The assistance was delivered not only through material presentations but also through discussion, observation, demonstration, and hands-on practice in the production area. With this approach, workers could connect GMP principles with the activities they perform, from personal hygiene, area sanitation, and equipment use to SOP implementation and production documentation. This is consistent with Sucipto et al. (2020), who showed that GMP and *Sanitation Standard Operating Procedure* (SSOP) implementation in small-scale food industries requires strengthening in worker hygiene, sanitation facilities, documentation, worker knowledge, and production supervision. Similarly, Darmawan and Maryati (2023), in their study of the Nozy Juice beverage industry, used observation and interviews to identify the level of GMP compliance and found several aspects that still needed improvement, including sanitation, worker behavior, facilities, and documentation.

In the context of AMDK UYUNA, these changes are important because GMP implementation is part of building a more standardized work system. SOPs that are better understood and consistently applied give workers clear guidance and reduce differences in how individuals work. Likewise, greater attention to personal hygiene and sanitation helps keep the production environment under control. Better organized documentation also gives the management a basis for tracing and evaluating any nonconformity in the production process. The assistance results therefore show that strengthening GMP is oriented not only toward product safety but also toward more systematic production process governance.

GMP Assistance and Production Process Efficiency

In this activity, efficiency is understood as a company's ability to run production in a more orderly, systematic, and controlled way through clear work procedures and the reduction of potential errors and waste. The assistance results show that improvements in SOPs, hygiene, sanitation, and documentation provide a basis for more orderly workflows. SOPs help workers know the work steps to follow, while documentation helps the management trace production activities and identify areas that still need improvement.

These findings show that improving efficiency does not always have to begin with technology investment or additional machines. At AMDK UYUNA, some of the initial problems related more to operational management, procedural standardization, discipline, and work consistency. GMP assistance was therefore directed at optimizing the existing work system. Improvements in these aspects have the potential to reduce ambiguity in work, improve coordination, and make supervision of the production process easier. GMP can thus be viewed as an operational management instrument that helps the company use resources in a more directed way.

AMDK UYUNA's production conditions show a production target of approximately 1,200 cartons per day, while actual production remains at around 650–700 cartons per day. This indicates a gap between target and actual production. However, this gap cannot be directly attributed to suboptimal GMP implementation, because production achievement can also be affected by other factors, such as labor availability, raw materials, equipment condition, production time, demand, and distribution. In this activity, these data are therefore used as a description of baseline production conditions and a rationale for strengthening the operational system, not as quantitative evidence that GMP implementation has increased productivity.

The contribution of the assistance to efficiency is therefore better seen in changes in the system and work practices. Greater SOP consistency, more regular sanitation, attention to hygiene, and better documentation are a foundation that can support operational efficiency sustainably. These findings are consistent with Sucipto et al. (2020), who placed resource efficiency, improved worker knowledge, supporting facilities, and supervision as important aspects of GMP and SSOP implementation in the food industry.

GMP Assistance in Supporting Production Process Quality

In this activity, production process quality is understood not only as final product quality but also as a company's ability to run production consistently, hygienically, with documentation, and in accordance with established procedures. The assistance results show that workers' attention to personal hygiene, production-area sanitation, SOP application, and documentation improved. These changes indicate a strengthening of the processes that underpin quality control.

SOP application provides guidance for workers to carry out production activities more uniformly. Personal hygiene and sanitation, in turn, help keep the production environment in line with food safety principles. Production documentation provides information that the management can use to check, trace, and evaluate completed activities. The relationship among these three aspects shows that production process quality is built through a series of controls carried out consistently, not only through inspection of the product at the final stage.

These findings are consistent with Darmawan and Maryati (2023), whose study of the beverage industry showed that GMP implementation covers various aspects, including production, sanitation facilities, equipment, employees, process control, storage, and documentation and recording. The results at AMDK UYUNA support this view because the changes after the assistance were visible not only in workers' knowledge but also in more structured work practices. GMP assistance can thus help build a production environment that better supports quality control.

From a food safety perspective, the application of hygiene, sanitation, process control, and documentation is also linked to the *General Principles of Food Hygiene*,

which place hygiene practices and hazard control as fundamental parts of food production (Codex Alimentarius Commission, 2020). In the national context, applying GMP principles is also related to meeting *Cara Produksi Pangan Olahan yang Baik* (CPPOB) requirements. Indonesian Food and Drug Authority Regulation No. 22 of 2021 governs the procedures for issuing CPPOB implementation permits for processed food (Badan Pengawas Obat dan Makanan [BPOM], 2021). The improvements made at AMDK UYUNA therefore have not only operational benefits but also strengthen a production system oriented toward food safety and quality.

The Role of Human Resources in the Success of GMP Implementation

The assistance results show that human resources are an important factor in the success of GMP implementation. The availability of SOPs and facilities will not yield optimal results if workers do not understand the purpose and method of applying them. AMDK UYUNA's baseline condition, marked by inconsistent SOP application and hygiene practices, shows that behavior and work habits need as much attention as the technical aspects of production.

The participatory approach used in the assistance gave workers space to voice constraints and obtain solutions based on real field conditions. This process helped build awareness that GMP is part of daily work activities, not merely an administrative requirement. After the assistance, workers began to pay better attention to SOPs, hygiene, sanitation, and documentation. This shows that improving human resource capacity is an important prerequisite for sustaining GMP implementation.

These findings are consistent with Amiroh et al. (2022), who showed the importance of human resource capacity building and evaluation through internal audits in maintaining GMP implementation. In their study, most participants said they were ready to conduct internal audits regularly after training. AMDK UYUNA therefore needs more than a one-time assistance program and should build a habit of periodic evaluation. Simple supervision of SOP compliance, area cleanliness, worker hygiene, equipment sanitation, and documentation completeness can serve as a mechanism to maintain GMP consistency.

Sustainability of GMP Implementation and Practical Implications

Sustainability is important because the changes that occurred after the assistance still need to be maintained and developed. The results show that SOP application, personal hygiene, sanitation, and documentation have improved, but long-term success depends on the company's consistency in maintaining these practices. The assistance results should therefore not stop at education but should continue as part of AMDK UYUNA's operational routines.

In practical terms, the management can periodically monitor SOP application, production-area cleanliness, worker hygiene, equipment sanitation, and production documentation. SOPs also need to be reviewed and updated whenever the production process changes. In addition, new workers need to be oriented on GMP so that the work standards that have been built can be maintained. The improved documentation can be used as a basis for evaluation and for identifying corrective actions when nonconformities are found.

The implications of this activity show that an assistance model combining baseline assessment, gap analysis, education, hands-on practice, monitoring, and evaluation can be a relevant approach for small- and medium-scale food industries. This approach not only improves workers' understanding but also helps companies integrate

GMP into operational activities. In the long term, consistent implementation can become the basis for developing SSOP, simple internal audits, more structured documentation (including digital documentation), and a better quality control system. Measuring the impact on productivity, production costs, and competitiveness still requires further evaluation over a longer period.

Limitations of the Activity and Directions for Development

This activity has limitations because the impact on efficiency and productivity was not evaluated using quantitative indicators over a long period. The changes found mainly describe changes in workers' understanding, SOP compliance, personal hygiene, sanitation, documentation, and work process regularity. The results therefore cannot yet be used to state the magnitude of productivity gains, cost savings, or increases in company profit in quantitative terms.

These limitations also restrict the generalizability of the results because the activity was carried out with a single partner, AMDK UYUNA, which has particular operational characteristics. Nevertheless, the findings give a practical picture of how GMP assistance can be used to strengthen the production system in small- and medium-scale AMDK industries. Future studies or assistance programs can use a longer observation period and add quantitative indicators, such as daily output, production time, nonconforming product rate, raw material use, production costs, labor productivity, and SOP compliance rate.

Overall, the results show that GMP implementation assistance had a positive initial impact on AMDK UYUNA's production system and practices. Changes in workers' understanding, SOP application, personal hygiene, sanitation, and documentation form a foundation for a more orderly and controlled production process. By sustaining these changes through monitoring, evaluation, and continued capacity building, AMDK UYUNA has a stronger basis to support operational efficiency and production process quality.

CONCLUSION

This community service activity, which provided assistance in implementing *Good Manufacturing Practices* (GMP) at AMDK UYUNA, was carried out through baseline assessment, gap analysis, implementation assistance, and monitoring and evaluation. The results show positive changes in the understanding and work practices of production workers, particularly in the application of *Standard Operating Procedures* (SOPs), personal hygiene, production-area sanitation, and production process documentation.

Direct assistance in the production environment encouraged workers not only to understand GMP principles in theory but also to apply them in daily operations. These changes had an initial impact in the form of a more orderly work process, greater compliance with procedures, and stronger quality control. GMP implementation thus provides a basis for AMDK UYUNA to improve production process quality and support operational efficiency.

However, this activity cannot yet demonstrate productivity gains quantitatively, because changes in production output, production costs, and productivity require observation over a longer period. The impact of this activity is therefore positioned as an initial change in work systems and practices that has the potential to support sustainable improvements in production efficiency and quality.

The program should be sustained through periodic GMP monitoring and evaluation, SOP updates, stronger production documentation, and continued worker capacity building. By maintaining these practices, AMDK UYUNA has a stronger basis to develop its quality control system and gradually increase business competitiveness. Future assistance programs are recommended to measure impact using quantitative indicators, such as daily output, process time, nonconforming product rate, raw material use, production cost, and labor productivity, over a longer observation period.

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ETHICS STATEMENT

The assistance in implementing Good Manufacturing Practices (GMP) at the AMDK UYUNA bottled drinking water factory did not require Institutional Review Board (IRB) approval or formal ethics committee review, because the activity focused on assisting and evaluating the company's operational practices and was not a clinical study or an intervention affecting human health. Information was collected through observation, interviews, and documentation related to the production process and GMP implementation.

Before the activity was carried out, the authors obtained permission from AMDK UYUNA. Informants involved in the interviews were informed of the purpose of the activity and that the information they provided would be used for academic purposes. Participation was voluntary, and the company's internal information was kept confidential. The data presented in the article are used to describe the implementation of the assistance and are not intended to harm the company or the informants.

DECLARATION OF GENERATIVE AI USE

In preparing this article, generative artificial intelligence was used in a limited way as an aid for language development, structuring the writing, and grammar editing. All field data, observation results, interview results, analysis, interpretation, and conclusions are the responsibility of the authors. Generative AI was not used to produce or replace field research data.

DATA AVAILABILITY STATEMENT

The research data, consisting of observation results, interviews, and documentation, were obtained from the assistance activities at AMDK UYUNA. These data were used to support the analysis of *Good Manufacturing Practices* (GMP) implementation, particularly production processes, hygiene, SOP application, process

control, storage, quality control, efficiency, and production quality. The full dataset is not publicly available because of the privacy of informants and the company's internal information, but limited access may be considered through the authors with the approval of the parties concerned.

CONFLICT OF INTEREST

The authors declare no conflict of interest that could affect the implementation of the assistance, the data analysis, or the preparation of this article.

AUTHOR CONTRIBUTION STATEMENT

Conceptualization: N, MF, MA, IJK; Methodology: N, MF, MA, IJK; Data Collection: N, MF, MA, IJK; Analysis: N, MF, MA, IJK; Writing – Original Draft: N, MF, MA, IJK; Review & Editing: N, MF, MA, IJK. All authors have read and approved the final version of the article for publication.

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