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GAP Analysis between Current and Post-Corrective Action of Good Manufacturing Practices in Dairy Processing Plant

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Abstract- Good Manufacturing Practices in the dairy industry reduce risks to food safety and protect public health. The objectives of this study are to determine whether microbiological risks exist in the factory and products in the GMP certified factory, to analyze the gaps in the GMP compliance and to reassess the microbial risks to close the gaps. After a thorough analysis of the GMP gap and root cause analysis for non-conformity, corrective measures were implemented, microbial test was retested, and statistical analysis was done by chi-square. Regarding the microbiological risk assessment of Escherichia coli, yeast and molds, coliform, and total plate count for swab and product samples, 7 out of 16 test results were satisfactory and 9 were unsatisfactory in the pre-project. An independent audit was then carried out using the SLS 143 GMP checklist, which revealed deficiencies in primary production(40%), design and facilities(45%), control of operation(25%), maintenance and sanitation(44%), personal hygiene(40%), transportation(20%), product information and consumer awareness(40%), and training(50%) among other areas. Overall, the audit results showed that only 60% did comply with SLS 143. All microbiological tests were positive after the necessary corrective action was taken. Moreover, a chi-square analysis showed significant differences in microbiological data before and after the project ($\chi 2=12.522$, df = 1, $p<0.001$). Research has effectively addressed the shortcomings in the dairy sector with the aim of encouraging the sector to adhere to GM standards to ensure the safety and nutritional value of dairy products.

Keywords: Dairy industry, GMP, Hygiene, Root cause analysis, Safety

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1. Introduction

Food hygiene refers to the conditions and measures that are crucial to ensure the safety and quality of food from production to consumption. The basic requirement of any food processing is to ensure that the food produced is safe for consumption and to protect public health (Kamboj et al., 2020). The Codex Alimentarius Commission, the international body that sets standards for foods, defines food hygiene as "all conditions and measures necessary to ensure the safety and suitability of food at all stages of the food chain" (CAC, 2009). Thus, the term food hygiene encompasses two concepts: food safety and food suitability (Malik et al., 2019). Food safety is a basic requirement, and food should be free from hazards to ensure the health and well-being of consumers. Food suitability is the process of ensuring that a food is suitable for human consumption for its intended use (Guarango, 2022).

Food safety hazards arise from the origin of food, poor food preparation and handling practices, and poor sanitary conditions throughout the food supply chain. The specific sources of hazards are microbiological, chemical, and physical contaminants, as well as biological toxins, including pesticide residues, veterinary drug residues, and allergens. The food industry uses modern systems to prevent and control the entry of these hazards. These include Good Manufacturing Practice (GMP), Good Hygiene Practice (GHP), Hazard Analysis Critical Control Points (HACCP), Food Safety Management Systems (FSMS), ISO 22000 and others (Beliaev et al., 2019). HACCP is a systematic approach that focuses on identifying and managing potential hazards in the food production process and is essential for individuals and companies involved in food production, processing, and distribution (Kushwah & Kumar, 2017). GMP or GHP can be considered one of the foundations of all food hygiene systems that support the production of safe and suitable food. Many food hazards that can contaminate food are addressed by GMPs and GHPs. That is, control of water quality (minimizes the presence of many potential biological, chemical, and physical hazards), control of faecal contamination (minimizes the potential for contamination with many foodborne pathogens such as *Salmonella* and pathogenic *E. coli* strains), control of food handling practices and hygiene (prevents many potentially communicable diseases that could be transmitted through food), control of food contamination through cleaning of food contact surfaces (removes bacterial contaminants, including foodborne pathogens, and allergens), etc. (FAO and WHO, 2023).

Good manufacturing practices (GMP) for food are a set of practices, conditions, and measures to ensure the production of safe, hygienic, and quality food products across the entire food supply chain, from production and processing to preparation and consumption (Beliaev et al., 2019 and van der Harst, 2005). These practices aim to prevent contamination, ensure safe handling of ingredients and product packaging materials, ensure proper hygiene, and maintain the integrity of the food production process. GMPs include guidelines and principles for building and equipment (location of premises, location of equipment, internal structure and fittings), design and layout of premises (layout, windows, equipment, and facilities), operational control, incoming materials, personal hygiene, cleaning and maintenance, transportation, product information, and training. These guidelines and principles help prevent food contamination and the introduction of foreign substances into the food production process (Murlidhar, 2016).

The benefits of complying with GMPs include lower operating costs as rework and penalties due to non-compliance are reduced and efficiency increases, improved product quality, increased customer satisfaction, improved public image, competitive advantage and respect for an organization committed to food safety. GMPs encompass all safe working conditions and written procedures. This makes employees more efficient and reduces errors in the manufacturing process. Also, ensure proper design, monitoring and control of manufacturing processes and facilities, extend the shelf life and storage period of products, and reduce the risk of foodborne illnesses through proper GMP (Meghwal et al., 2017).

The dairy industry is a crucial sector with significant potential to boost the economy while providing a highly nutritious and tasty beverage (Pathumsha, 2016). However, milk is highly perishable, and various food safety hazards – physical, chemical and microbiological – can affect the quality and safety of dairy products. Microbial hazards in the dairy industry include pathogenic bacteria and spoilage microorganisms. Pathogenic bacteria such as *Salmonella, Escherichia coli, Listeria monocytogenes and Campylobacter spp*. can contaminate dairy products and pose a serious health risk (McCaul, 2019). Although spoilage microorganisms are not usually harmful, they can affect the quality and shelf life of dairy products. Chemical hazards in the dairy industry arise from pollutants such as antibiotics, pesticides and mycotoxins. These chemicals can enter dairy products in various ways, including through veterinary drugs and environmental exposures. Physical hazards arise when foreign objects such as glass, metal, plastic or wood particles accidentally contaminate dairy products during processing, packaging or transport (Asselt et al., 2016). Controlling physical hazards is critical to consumer safety and the long-term sustainability of the food industry. Effective measures include supplier control and testing, facility design and maintenance, quality control, traceability and recall systems, and education and awareness (Onyeaka et al., 2023). To mitigate chemical hazards, the dairy industry can implement supplier control and quality assurance, proper use of veterinary drugs, pesticide control, cleaning and sanitation protocols, water quality management, allergen separation and labelling, employee training, regular testing and monitoring, traceability and recall procedures, and regulatory compliance (Asselt et al., 2016). Control of microbiological hazards includes measures such as ensuring personal hygiene, compliance with strict hygiene regulations, use of high-quality raw materials, pasteurization and heat treatment, temperature control, quality testing and monitoring, use of preservatives and protective cultures, handling of allergens, training of employees and compliance of regulations and maintaining traceability and recall procedures (McCaul, 2019).

Good Manufacturing Practice (GMP) regulations and standards are crucial in ensuring the quality, safety, and efficacy of products in food industries (Theodoridis & Kraemer, 2010). Good Manufacturing Practices (GMP) for food, Codex Alimentarius, and national standards like the Sri Lanka Standards (SLS) play significant roles in ensuring food safety, quality, and hygiene. Codex General Principles of Food Hygiene principles provide a foundation for food safety standards, including GMP requirements for food production (FAO & WHO, 2023). The Sri Lanka Standards Institution (SLSI), established by an Act of Parliament in 1964, serves as the country's national standards body. Its core responsibility involves formulating national standards applicable across all sectors of the economy. Among its array of services are Product Certification (via the SLS Marks Scheme), Systems Certification like GMP provision of training, laboratory services, information services, equipment calibration, and quality checks for specific products. SLSI's Sri Lanka Standard Code of Practice, specifically SLS 143, delineates general principles for food hygiene (Kahatapitiya et al., 2015).

Obtaining GMP certification is a significant achievement for a food factory, as these certifications are meant to ensure the quality and safety of products. However, some of the industries do not always adhere to the required protocols laid down by these standards after obtaining the certification. It is imperative to address and rectify any deviations from established standards in such instances. Continuous adherence to all the certified standards including GMP is essential to maintain product quality, ensure food safety, and meet regulatory requirements. The objectives of this study are to assess the microbiological risk in the plant and products in a GMP certified milk factory, investigate the non-compliance with the SLS 143, analyze the root causes of the non-compliance, take the necessary corrective measures to address the non-compliance and reassess the microbiological risk in the plant and products.

2. Methodology

A. Conduct Microbial Testing before the Project

1) Swab sampling and microbial testing for surface

First, both hands were washed, and gloves were put on. Sterilized cotton swabs were used to collect samples (autoclaved at 121°C for 15 minutes). The sterilized swab was dipped in normal saline and then rubbed over the desired surface (10 x 10 cm) in a zigzag motion while rotating the swab to ensure thorough sampling. Do not touch the cotton swab to avoid contamination. The swab was placed in a sterilized bag, labelled, and the sample was sent to the laboratory under cold conditions (4 ^{0}C) to test for coliform bacteria levels. Samples from different locations: food contact surface - ice cream packaging table, packaging material - jelly yogurt cups, equipment - plastic yogurt filling cups, machine yogurt filling machine. “A” person – “A” is a person in the packing room, “B” person – “B” is a person who packs yogurt. The collected samples were subjected to coliform testing.

2) Sampling and Microbial testing for products

Yoghurt and curd samples (n=20) were randomly selected for testing and sent to the Veterinary Research Institute (VRI) under cold conditions for microbiological tests: E-coli, yeast and mold, coliform and total bacterial count tests.

B. Gap Analysis of GMP Implementation

Based on SLS 143 (Sri Lanka Standards Institute, 2016), the checklist was created and checked for efficiency and defects in the production facility. The objectives, scope, and duration of the audit were systematically communicated to management and employees. Factory operations, infrastructure, and general hygiene were observed when conducting the audit. Detailed inspection and verification were carried out in the raw material receiving areas, storage areas, production areas, packaging areas and transportation inspections. The documents and records related to GMP compliance, including employee training, sanitation, equipment maintenance, and production batch records, were reviewed. The audit findings were categorized according to their potential impact on product quality and safety, and their severity and non-conformity were determined based on the evidence. The audit report was provided to management to take necessary corrective actions.

C. Conduct Root Causes Analysis

For the non-conformance identified by the audit, a root cause analysis of the issues was conducted using the Fishbone Diagram, Brainstorming Diagram, 5Y Technique, Flowchart, and Mind Map techniques.

D. Corrections and Corrective Actions for Identified Gaps

Appropriate corrective actions have been suggested to prevent the recurrence of identified non-conformities. Corrective measures were mainly implemented for primary product cleaning, maintenance and personal hygiene, internal structure and equipment, equipment cleaning, storage, operation control, cleaning procedures, personal behavior, awareness and responsibility, training program, instruction and supervision, etc. After the corrections above procedure of Microbial testing for products, Gap Analysis of GMP Implementation was performed.

E. Microbial Testing after the Implementation of corrective actions

Sampling and microbiological testing for swabs and products were re-performed after corrective action was implemented, just as sampling and microbiological testing were performed prior to the project, as described in "Conducting Microbiological Testing Pre-Project."

F. Statistical Analysis

Statistical analysis was subjected to chi-square test for each parameter to determine the significant difference between before and after corrective actions at the level of $p = 0.05$ using SPSS version 25.0.

3. Results and Discussions

A. Microbiological Test Results before Implementation of the Project

1) Results of Microbial Tests for Products

Table 1
Microbial test results before the project

Parameter (CFU/ml)	Results	
	Yogurt sample	Curd sample
E coli	Satisfactory	Satisfactory
Yeast	Satisfactory	Unsatisfactory
Molds	Satisfactory	Unsatisfactory
Coliform	Unsatisfactory	Unsatisfactory
Total Plate Counts	Unsatisfactory	Unsatisfactory

Note: The terms "satisfactory" and "unsatisfactory" are based on SLS standards. The results were compared with the ones standards.

The yogurt samples, three of the five evaluated parameters met the required standards, and the levels of *E. coli*, Yeast, and Mold were within the acceptable limits according to SLS standards (Table 1). However, the Coliform and Total Plate Counts were unsatisfactory, indicating issues with the microbial quality of the yogurt. These problems may stem from inadequate hygiene practices, flaws in the production process, or poor storage conditions, raising significant concerns. Similarly, the test results for the curd sample revealed that only the *E. coli* level was satisfactory, while the levels of Yeast, Mold, Coliform, and Total Plate Counts were unsatisfactory. This points to a widespread issue with microbial contamination, compromising the quality and safety of the milk products. These findings highlight the critical need for stringent quality control measures throughout the entire production and distribution chain of dairy products. Implementing robust hygiene practices, improving production processes, and ensuring proper storage conditions are essential steps to safeguard the microbial quality and overall safety of dairy products.

2) Results of Swab Sample Testing

Table 2
Swab sample test results before the project

Swab Samples	Results (Coliform CFU/ml)
Ice packing table	Unsatisfactory
Jelly yogurt cup	Satisfactory
Plastic cup used for yoghurt filling	Unsatisfactory
Yoghurt filling machine	Satisfactory
"A"- Person	Satisfactory
"B"- Person	Unsatisfactory

Note: The terms "satisfactory" and "unsatisfactory" are based on SLS standards. The results were compared with the standards of the one.

Swab samples were analyzed for Coliform CFU/ml (Table 2). According to the results, three out of six samples were satisfactory, and three out of six were in unsatisfactory condition. This analysis highlights the mixed quality of surfaces and personnel involved in the manufacturing, packaging, and filling processes. The unsatisfactory results for the ice packing table, the plastic cup used for yogurt filling, and person "B" suggest potential issues such as inadequate cleaning and sanitization practices, improper handling, or insufficient personal hygiene. These findings emphasize the critical importance of adhering to stringent sanitary standards to ensure the safety and quality of dairy products. It is crucial to address these unsatisfactory conditions to prevent microbial contamination and maintain high hygiene standards throughout the production process.

B. Results of the Audit Conducted

In Table 3, compliance ratings for various operational aspects of a production facility. Primary production and personal hygiene both have a compliance rate of 60%, indicating moderate adherence to standards but room for improvement. Design and facilities compliance is slightly lower at 55%, suggesting nearly half of this area fails to meet requirements. Control of operation stands out with a high compliance rate of 75%, showing robust practices in this category. Maintenance and sanitation, however, are compliant only 56% of the time, indicating significant deficiencies. Transportation shows strong compliance at 80%, reflecting effective practices in this area. Product information and consumer awareness have a 60% compliance rate, while training shows an equal split of 50% compliance and non-compliance, highlighting a need for better training programs. Overall, the table underscores the necessity for targeted improvements in several key areas to ensure comprehensive adherence to standards.

Table 3
Summary of the audit results

Requirement	Compliance rating	
	Yes	**No**
Primary production	60%	40%
Design and Facilities	55%	45%
Control of operation	75%	25%
maintenance and Sanitation	56%	44%
personal hygiene	60%	40%
Transportation	80%	20%
Product information & consumer awareness	60%	40%
Training	50%	50%

C. Root Cause Analysis

Root cause analysis identified and addressed the underlying issues from the audit using tools like the Fishbone diagram, brainstorming, the 5 Whys technique, flow diagrams, and mind maps. Major findings included a lack of proper waste management and cleaning practices in primary production, inadequate equipment layout and maintenance in design and facilities, and insufficient hygiene control systems in operations (Figure 1). Maintenance and sanitation practices were irregular, personal hygiene rules were poorly followed, and transportation containers were improperly used. Additionally, there was a lack of health education programs for consumers and insufficient staff training. To resolve these issues, solutions such as implementing comprehensive waste management, redesigning facility layouts, enforcing stringent hygiene protocols, documenting cleaning programs, and providing regular training were recommended. These steps are essential to improve compliance and ensure the safety and quality of the production process.

1) Poor Hand Hygiene (Fishbone diagram)

Root cause analysis of poor hand hygiene through the fishbone diagram revealed several key factors contributing to the problem. Cultural factors, including lack of handwashing habits, personal beliefs, ineffective communication, and attitudes that hinder adherence to hand hygiene protocols, should be considered. Equipment-related issues, such as lack of essential items such as soap and hand sanitizers, as well as inadequate maintenance of equipment, exacerbate the problem. Management weaknesses, including lack of punitive regulations, inadequate surveillance, inadequate supervision, and lack of standardized training programs, further contribute to the prevalence of poor hand hygiene practices. Furthermore, human factors, such as lack of attention to hand hygiene, low awareness levels, and inadequate training, underscore the need for comprehensive interventions targeting education.

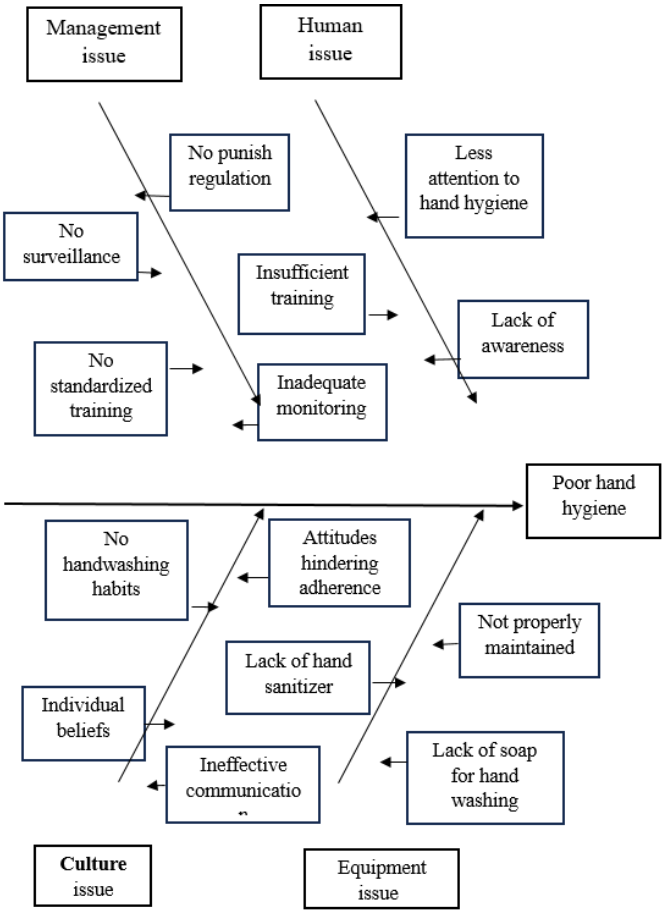

Figure 1. *Fishbone diagram*

2) Not Proper Cleaning Procedure (Brainstorming diagram)

Root cause analysis for the problem of lack of proper cleaning procedure revealed several critical factors contributing to the problem. Management and supervisory weaknesses emerged as significant issues, including inadequate supervision, limited time frames leading to a lack of guidance, unclear guidelines, and lax implementation of cleaning protocols among employees (Figure 2). Furthermore, the absence of a structured training program and lack of provision for training seems to have exacerbated the problem, highlighting the need for comprehensive training initiatives. It is clear that equipment-related issues such as outdated cleaning tools and lack of designated spaces for cleaning equipment further hinder effective cleaning procedures. This highlights process-related weaknesses such as organizational weaknesses in maintaining cleaning standards, post-cleaning record keeping, and inadequate cleaning schedules. In addition, human behavioral factors such as familiarity, lack of accountability, and complacency appear to pose challenges to implementing optimal cleaning procedures. Addressing these issues through targeted interventions, including improved monitoring, comprehensive training programs, equipment upgrades, improved processes, and fostering a culture of accountability, can help establish and maintain an effective cleaning procedure.

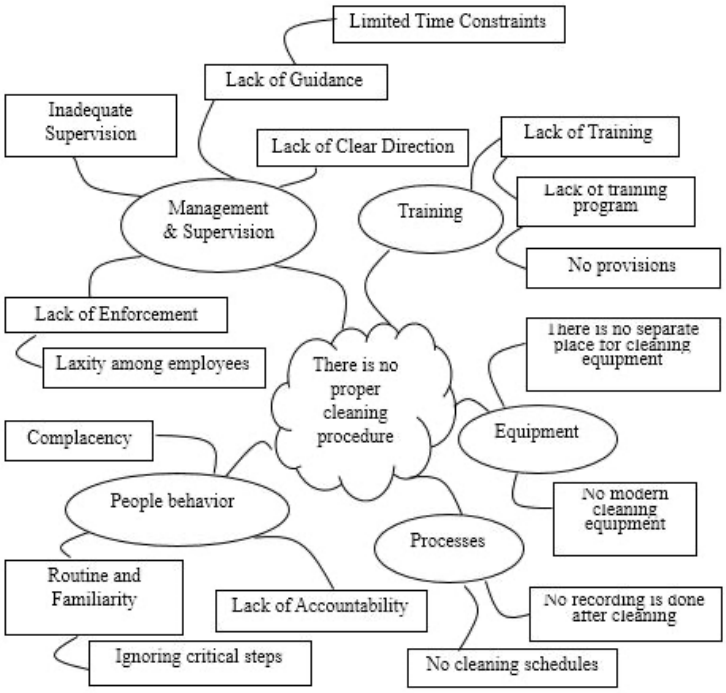

Figure 02. *Brainstorming diagram for the problem of not having a proper cleaning procedure*

3) Poor Waste Disposal (5Y technique)

A root cause analysis conducted on the problem of poor waste disposal using the 5Y technique revealed a series of interrelated causes. Non-segregation of waste and disposal of all types of waste in the same polythene bag was the primary problem identified (Figure 3). This problem arises due to a lack of awareness among employees about the importance of waste segregation, lack of proper awareness programs, and lack of supervision. This has resulted in the absence of a dedicated supervisor to oversee the waste disposal process, as only one manager supervises the entire production department. To meet this challenge,, employees should be made aware of the importance of waste segregation through continuous awareness programs, time management for effective training sessions should be optimized, and a structured waste disposal process should be implemented. In addition, it is proposed that a comprehensive legal framework be implemented aimed at regulating waste disposal practices to ensure long-term compliance and sustainability.

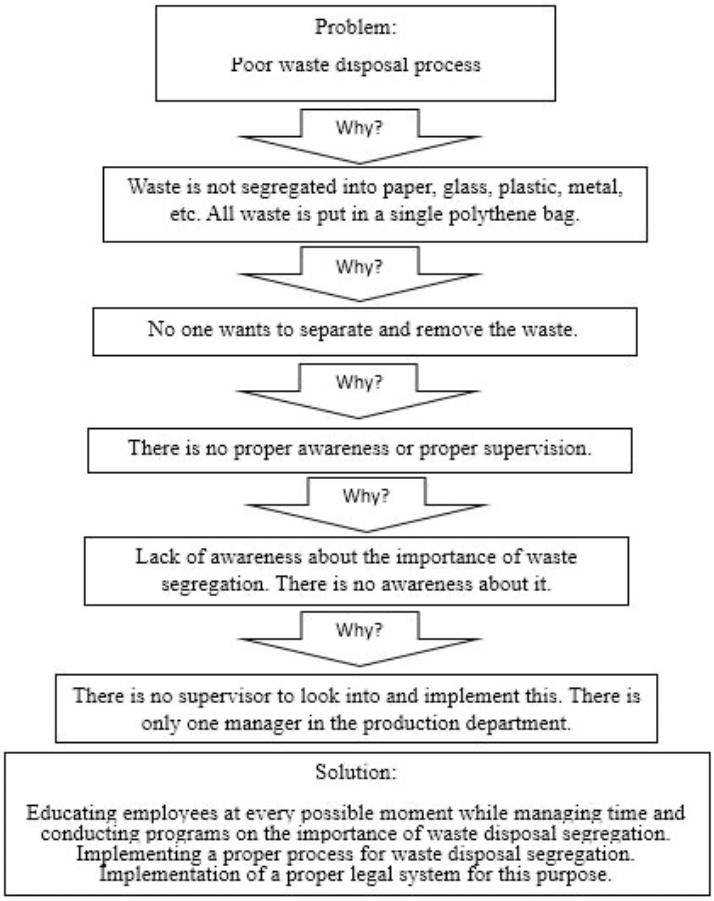

Figure 03. *5Y technique for the problem of poor waste disposal*

4) Unsanitary Storage of Foods and Materials (Flow diagram)

The analysis of unsanitary storage of food and materials using the flow diagram method began with a preliminary investigation of whether the food and materials were stored hygienically (Figure 4). There was a noticeable lack of cleanliness practices, and the floor was not consistently clean. However, positive practices such as using pallets whenever possible and maintaining separate storage areas for finished foods, ingredients, and other materials were identified as solutions. Adequate control conditions and storage conditions must be constantly monitored to maintain food safety standards. These measures can reduce the risks associated with unsanitary storage practices.

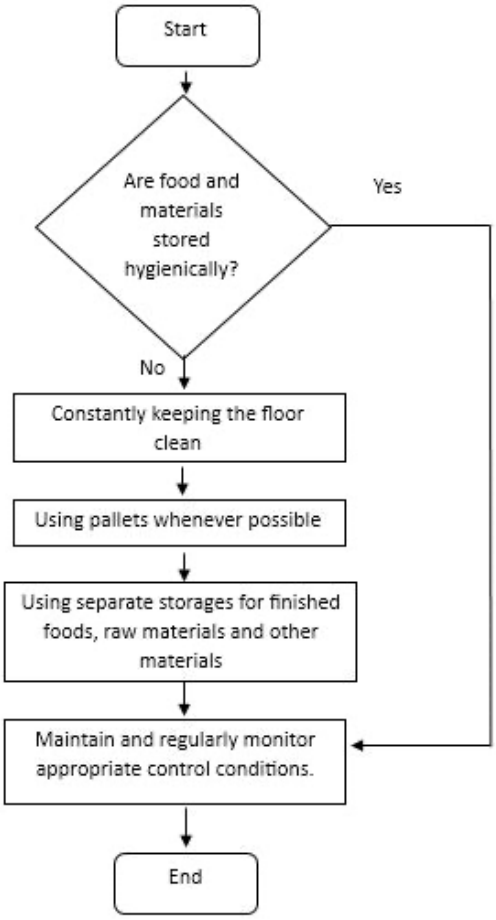

Figure 4. *Flow diagram for the problem of unsanitary storage*

5) Not Using Personal Protective Equipment (Mind Map)

A root cause analysis of the problem of non-use of personal protective equipment (PPE) was conducted using mind mapping and revealed a multifaceted set of factors contributing to the problem. The analysis identified various aspects of personnel behavior, training and awareness, culture and attitudes, capital, facility, policies, procedures, and management (Figure 5). Under individual behaviour, the reasons identified were individuals neglecting the importance of PPE, lack of accountability, and false beliefs about their insecurity. In addition, inadequate training and awareness programs, along with ineffective communication and lack of understanding of PPE use, also contribute to this. Cultural factors, such as ingrained habits and beliefs, hinder the adoption of proper PPE practices. Management weaknesses such as inadequate record keeping, monitoring, and surveillance are also affected. The problem is also exacerbated by inadequate capital allocation for PPE, lack of modern facilities, and inadequate policies and procedures that enforce the use of PPE. Addressing these root causes requires comprehensive interventions, including targeted training and awareness programs, fostering a culture of safety and accountability, securing adequate capital for PPE procurement, improving facilities, and implementing strong policies and regulations.

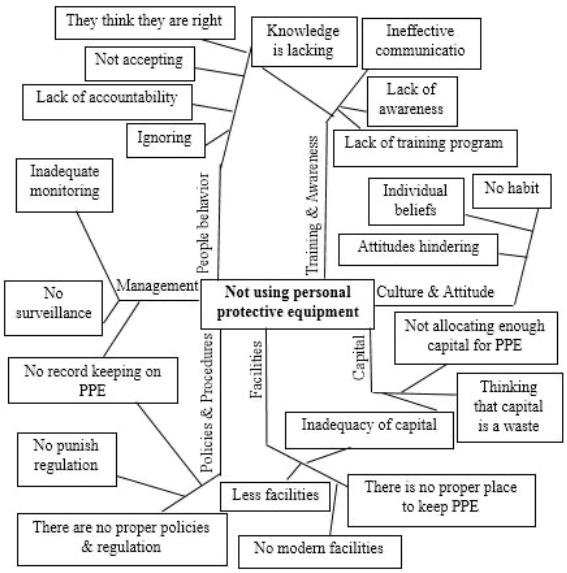

Figure 5. *Mind map for the problem of use of personal protective equipment*

D. Corrections and Corrective Actions Taken for Identified Gaps

Corrective actions were taken to address identified gaps across various areas. In primary production, a proper waste management system was implemented, ensuring waste segregation and disposal, while cleanliness of raw materials, storage areas, and equipment was maintained, with food handlers following strict hygiene practices (Table 4). The establishment's design and facilities were improved by managing limited space, repairing and painting walls, and removing corroded equipment. Hazardous materials were stored separately, and damaged light fixtures were repaired. Operations were controlled through random swab tests, restricted access to the processing area, and training supervisors on food hygiene principles. Maintenance and sanitation were enhanced by repairing equipment, implementing cleaning and disinfection programs, and reinforcing pest control measures, with microbial testing on food contact surfaces. Personal hygiene practices were strengthened, with food handlers adhering to hand hygiene rules and wearing protective clothing. Food transport containers were designated for food use only. Plans were made for health education programs to raise consumer awareness of food hygiene and the importance of temperature control. Additionally, staff were trained on food contamination prevention, hygiene practices, and microorganism control, with supervisory duties reassigned to improve food safety management.

Table 4
Summary of the corrections taken

Requirement	Corrective action Rating		
	No. of nonconformance identified	No. of Corrected	Completion rate (%)
Primary production	4	4	100.00
Design and Facilities	19	13	68.42
Control of operation	6	6	100.00
maintenance and Sanitation	11	8	72.72
personal hygiene	4	4	100.00
Transportation	1	1	100.00
Product information & consumer awareness	2	1	50.00
Training	6	6	100.00
Total	53	43	81.13

E. Microbiological Test Results after Implementation of the Project

1) Results of microbial tests for products

Table 5
Microbial test results after the project

Parameter (CFU/ml)	Results	
	Yogurt sample	Curd sample
E coli	Satisfactory	Satisfactory
Yeast	Satisfactory	Satisfactory
Molds	Satisfactory	Satisfactory
Coliform	Satisfactory	Satisfactory
Total Plate Counts	Satisfactory	Satisfactory

Note: The terms "satisfactory" and "unsatisfactory" are based on SLS standards. The results were compared with the ones standards.

The results of yogurt and milk samples after GMP development showed satisfactory levels across all parameters tested. Both yogurt and curd samples met acceptable standards for E. coli, Yeast, Mold, Coliform, and Total plate counts as defined by SLS standards (Table 5). These results indicate that GMP development has effectively improved the microbiological quality

and safety of yogurt and dairy products. This result is critical to boosting consumer confidence and ensuring regulatory compliance in the dairy industry. Successful implementation of GMP enables consumers to be provided with safe and high-quality dairy products.

2) Results of swab sample testing

Table 6
Swab sample test results after the project

Swab Samples	Results (Coliform CFU/ml)
Ice packing table	Unsatisfactory
Jelly yogurt cup	Satisfactory
Plastic cup used for yoghurt filling	Unsatisfactory
Yoghurt filling machine	Satisfactory
"A"- Person	Satisfactory
"B"- Person	Unsatisfactory

Note: The terms "satisfactory" and "unsatisfactory" are based on SLS standards. The results were compared with the ones standards.

After the implementation of Good Manufacturing Practices (GMP), swab samples collected from various surfaces in the production environment showed satisfactory results according to the standards set by the Sri Lanka Standards Institution (SLS) (Table 6). These improvements indicate enhanced sanitation and hygiene practices in the manufacturing facility post-GMP implementation. The results underscore the efficacy of GMP protocols in ensuring microbiological safety and quality of dairy products by maintaining low levels of coliform bacteria across various surfaces and personal contact points. This confirms the effectiveness of GMP measures in reducing the risk of food contamination and ensuring product integrity in the dairy industry. Studies have shown that implementing GMP significantly reduces microbial contamination, thereby improving overall food safety (Kramer & Schwebke, 2020).

F. Relationship between Variables

Here, the relationship between the industry conditions before and after the implementation of GMP development was assessed through micro-testing.

Table 7
Microbial test results

Microbiology Tests	Satisfactory	Unsatisfactory	P-Value
Pre-project	43.75% (7)	56.25% (9)	<0.001
Post-project	100% (16)	0% (0)	

Thus, the pre-project microbiology test showed 43.75% satisfactory and 56.25% unsatisfactory results. After developing the GMP, post-project testing yielded satisfactory results, reflecting a 100% success rate and complete elimination of unsatisfactory results. Furthermore, according to the chi-square analysis ($\chi^2 = 12.522$, df = 1, $p<0.001$), there is a significant difference between microbiology test results before and after GMP development (Table 7). This result provides compelling evidence for the effectiveness of GMP development in shaping and improving the industry's practices. These results emphasize the importance of continued adherence to GMP standards for ensuring quality and safety in the industry.

4. Conclusion

The gap analysis between current Good Manufacturing Practices (GMP) and post-corrective action at a dairy processing plant confirmed that the implementation of GMP was successful. The deficiencies identified in the GMP-related practices were thoroughly investigated, and necessary corrective actions were taken. The benefits of developing GMP in the dairy industry are evident in several areas. Quality control improved significantly, ensuring that products met rigorous standards. Product safety was enhanced by identifying and rectifying deficiencies, leading to a reduction in potential risks. Consumer confidence increased due to the heightened commitment to GMP standards. Hygiene and product quality standards were raised, contributing to the overall improvement of operational processes. These advancements not only ensured compliance with regulatory requirements but also bolstered the reputation of the dairy industry. Profitability saw an upswing due to increased production volumes resulting from streamlined and efficient manufacturing processes. The successful implementation of GMP standards played a pivotal role in establishing a foundation for sustained growth and success within the dairy industry. Where there are specific concerns or problems with the implementation of GMP in a plant, it may be useful to undertake a thorough review, address any shortcomings in compliance and strengthen the quality and safety culture within the organization. regular assessments and corrective actions may help to maintain the integrity of the certification process and contribute to the long-term viability of the plant.

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