


BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

DEPARTMENT OF ENVIRONMENTAL SCIENCE

Implementation of a food safety management system based on ISO 22000:2018 at beverage manufacturing industry: empirical evidence of procedural limitations and success stories

By

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A RESEARCH PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS OF A BACHELOR OF SCIENCE HONOURS DEGREE (BSc. SHEM) IN SAFETY, HEALTH AND ENVIRONMENTAL MANAGEMENT

MAY 2025

DECLARATION

To be complied by the student

Registration number B211467B

I Mutsigwa Tanaka, do hereby declare that this work is my original work and it was never been submitted before. All the work derived from other sources is indicated in the project.

Student signature:  Date 30 May 2025

To be complied by supervisor

This dissertation is suitable for submission to the faculty and have been checked for conformity with the faculty guidelines.

Supervisor's signature: Date: 30 May 2025

DEDICATION

This project is dedicated to my late father, Forbes Mutsigwa, whose memory continues to inspire me. I also dedicated this work to my mother, whose unwavering support and love have been invaluable throughout my journey.

ACKNOWLEDGEMENTS

I would like to express my deepest gratitude to my supervisor, Dr A. Kanda for this guidance and support throughout this project. My heartfelt thanks also go to God for granting me the strength and wisdom needed to complete this research. I am also grateful to my family for their unwavering encouragement and to my friend for their limitless support during this journey. Lastly, I extended my special thanks to Pro group for their invaluable training during my industrial attachment.

ABSTRACT

Background: The food and beverage sector directly influence on nutrition and food safety. However, contaminated food causes over 200 diseases and affects millions globally, particularly the elderly and children under the age of five years.

Objective: Evaluation of implementation of a food safety management system based on ISO 22000:2018 at beverage manufacturing industry for low- and middle-income settings using a Zimbabwean beverage company (Prodairy) as a case study.

Methods: A descriptive case study was done at Prodairy Private Limited, Ruwa, Zimbabwe from August 2024 to May 2025. A face to face in depth interview and a closed ended questionnaire were used to solicit data from 128 employees. Prodairy ISO 22000:2018 implementation documents were reviewed and analyzed using mixed method appraisal tool. Blooms cut off point was used to score on the agreement of participants on the challenges and successes of ISO 22000:2018 implementation. Thematic analysis was used to analyse qualitative data.

Key findings: A moderate agreement (62.5%) found using blooms cut off points for strong agreement between participants that there were challenges encountered during ISO 22000:2018 implementation which include inadequate training, resistance to change by employees and lack of employee consultation. On success there was a strong agreement (80.5%) using blooms cut off points that ISO 22000:2018 achieved some successes including improved competitive advantage and employee awareness to safety at Prodairy. The presence of well documented training records and procedures at Prodairy shows commitment to ISO 22000:2018 implementation.

Key terms: Food safety management system (ISO 22000:2018), beverage, manufacturing industry, implementation challenges, implementation successes, participants.

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CHAPTER 1: INTRODUCTION

1. INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The food and beverage sector represents a critical pillar of public health and global economic development (WHO, 2022). On the other hand, food and beverage, economic sector which is directly influences nutrition and food safety with contaminated food causing over 200 diseases and affecting millions globally particularly vulnerable population usually children under the age of five or elderly population (Ehuwa et al., 2021; Pai et al., 2024) Due to market competitions of organisations, the implementation of food safety management systems (FSMS) has become increasingly important to win in the market, particularly in the low ad middle income countries, where food safety challenges persist alongside rapid industrialization (Macheka et al., 2022).

The International Organization for Standardization (ISO) developed ISO 22000: 2018 to provide a comprehensive framework for food safety management systems (FSMS). This integrates Hazard Analysis and Critical Control Points (HACCP) principles with practical management tools (Mucea et al., 2025). HACCP is proactive in identifying and controlling potential hazards, thereby enabling food safety and compliance when it is integrated with other systems in an organisation (Mucea et al., 2025). Recent studies indicate that effective implementation of FSMSs in LMICs faces many challenges, including resource constraints, technical capacity limitations, and cultural adaptations (Madilo et al., 2024; Abass et al., 2024; Adekanbmbi et al., 2024).

In the Zimbabwean context, the food and beverage manufacturing sector has shown growing interest in international standards shown by the number Zimbabwean organisations which implemented the food safety standard such as Delta beverages, Verun Beverages Tanganda tea and many other large and medium enterprises (Nyoka et al., 2023). The implementation remains problematic due to various organizational and environmental factors such as insufficient resources from governing bodies, fragmented oversight due to poor communication between government agencies and stockholders (Mhlanga et al., 2020; Mugadza et al., 2024).

An example is shown by a study carried out at Delta Harare by Musungwa and Kowe in 2022 shows that beverage companies are facing major challenges in implementation of safety and health standards at their respective companies which include inability to address new safety risks due to outdated regulations that miss the modern challenges for example the food and food standard act of 2001 which is now 24 years old and also lack of integration of technology in monitoring and compliance processes leading to inefficiencies (Musungwa and Kowe. 2022). Although there are challenges companies such as Delta beverages are excelling in the market due to the trust from the consumers due to the quality and food safety standards implemented (Musungwa and Kowe. 2022).

Prodairy PVT Ltd, is a beverage manufacturing organisation which operates in Ruwa, Zimbabwe. It adopted the FSMS (ISO 22000: 2018) in 2019 due to market competition with other companies who were already in the market. It provides a practical example of a beverage manufacturing organisation that has navigated associated challenges and enjoyed success stories of adopting a FSMS under LMIC settings (Aslani, et al., 2024). It has been used in this study as a case study.

1.2 PROBLEM STATEMENT

Despite the availability of relevant international standards and national legislation in the food and beverage sector, many organisations in Zimbabwe struggle with the effective implementation of integrated FSMSs (Mhlanga et al., 2020). This limitation may create potential risks for food safety, product quality, and overall operational efficiency (Nyoka et al., 2023). While studies have examined FSMS implementation broadly (Mhlanga et al., 2020; Mugadza et al., 2025), there is limited research on the specific challenges and success factors in implementing ISO 22000:2018 within Zimbabwe's beverage manufacturing context, particularly integrateng local operational practices with international standards (Macheka et al., 2022). It is showing that there are challenges In Syria, Tanzania and UK of cost implication and resistant to change and opportunities of a gained competition advantage, operational improvements and regulatory improvement (Aslani et al., 2024; Rihawi, 2024). In Zimbabwe the challenges and success factors are different with that of other countries on that in Zimbabwe other laws are outdated which make it difficult to cope up with new technologies and also inflation (Musungwa and Kowe. 2022).

1.3.1 AIM

To evaluate the challenges and success of implementing ISO 22000: 2018 at a food and beverage manufacturing organisation in Zimbabwe.

1.3.2 OBJECTIVES

- To review the implementation of ISO 22 000: 2018 at Prodairy PVT Ltd.Zimbabwe
- To determine challenges and success factors in implementing ISO 22000:2018 at Prodairy PVT Ltd., Zimbabwe.

- To develop a structured framework for successful ISO 22000:2018 implementation in beverage manufacturing facilities within LMIC settings based on empirical findings.

1.4 SIGNIFICANT OF STUDY

This research may contribute importantly to various stakeholders regarding ISO 22000:2018 implementation under LMIC settings, particularly in Zimbabwean context. This is done by enhancing the country food safety by identifying limitations of procedures and success stories there by assisting on ensuring that beverages produced meets the required safety standards, leading to the protection of the consumer health and meeting safety regulations. The findings may provide valuable insights to policymakers, industry leaders and practitioners in Zimbabwe's food and beverage sector regarding effective integration of international food safety standards with local operational contexts. Furthermore, the developed implementation framework may serve as a practical guide for similar organisations in developing countries pursuing ISO 22000:2018 certification.

1.5 RESEARCH QUESTIONS

1. What challenges were met and successes experienced when implementing ISO 22000: 2018 at Prodairy PVT LTD’s, Zimbabwe?
2. Which elements should be included in a framework for successful implementation of ISO 22000: 2018 at a beverage manufacturing organisation under LMIC settings, particularly in Zimbabwe?

1.6 ASSUMPTIONS

- Management and staff at Prodairy PVT LTD's will provide full cooperation during the research process

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- The implementation period will be sufficient to observe meaningful changes in food safety outcomes
- The company's documentation and records will be accessible for analysis

1.7 LIMITATIONS

- The study may focus on a limited number of beverage manufacturing facilities which may not represent the entire industry and could lead to biased conclusions.
- The time frame for observation will be limited to the implementation period missing long term impacts and changes in practices.
- The difference in organizational sizes resources, management participation and commitment may influence the outcomes making it difficult to generalize findings across all beverage manufactures.

1.8 DELIMITATIONS

- The research will be conducted within Prodairy PVT LTD's operational boundaries.
- The study may focus on recent studies on implementation of ISO 22000:2018 potentially overlooking historical practices and their evolution.
- The study will emphasize organizational and operational aspects rather than technical production details
- The study will focus specifically on ISO 22000:2018 implementation
- The study will emphasize organizational and operational aspects rather than technical production details
- The time frame for observation will be limited to the implementation period

CHAPTER 2: REVIEW OF LITERATURE

2. LITERATURE REVIEW

2.1 INTRODUCTION

This chapter presents a comprehensive review of literature related to ISO 22000: 2018 implementation in the food and beverage industry, with particular focus on low- and middle-income countries (LMICs). The review examines frameworks, implementation challenges, success factors and current knowledge gaps in implementing food safety management systems (FSMSs). It provides a theoretical framework guiding the study. It ends with a summary highlighting overview of key components of FSMS, implementation challenges and success factors.

2.2 ISO 22000:2018 FOOD SAFETY MANAGEMENT SYSTEM

2.2.1 OVERVIEW AND KEY COMPONENTS

ISO 22000:2018 represents a comprehensive approach to food safety management, integrating Hazard Analysis and Critical Control Points (HACCP) principles with management system elements. The standard emphasizes risk-based thinking and incorporates the Plan-Do-Check-Act (PDCA) cycle at both operational and strategic levels (ISO, 2021). Key components include:

Table 2.1. Key components of ISO 22000:2018 (ISO 22000;2018)

Component	Description

Context of the organization	This ensure organisations to understand their surroundings which are internal and their external stakeholders (interested parties) needs and expectations.
Leadership commitment	This clause is important because it emphasises the importance of top management commitment to FSMS.
Planning and risk management	This make the organisation to be able to identify risks and critical control points of processes of food production.
Support processes and resources	This clause emphasises on the issue of resource allocation and provision, competence, awareness, documentation, and communication for the effective implementation of ISO 22000:2018
Operational controls	This clause focuses on the planning and control of operation processes to ensure food safety throughout the food chain.
Performance evaluation	Ensures the monitoring, measurement, analysis and evaluation using inspection checklist and audits to check FSMS performance.
Continuous improvement	This makes use of inspection and audit results for continual improvement of FSMS.

2.2.2 IMPLEMENTATION RREQUIREMENTS

Recent studies highlight that successful implementation of ISO 22000:2018 requires systematic attention to several critical areas (Adisusilo & Ikshan, 2024; Rihawi, 2024).

- Development of food safety policies and objectives
- Establishment of prerequisite programs
- Implementation of HACCP principles
- Documentation and record-keeping systems
- Internal audit processes
- Management review procedures

Table 2.2. Studies indicating challenges and success factors for implementing ISO 22 00:2018 in the food and beverage sector

Country	Challenges	Successes	Reference
Zimbabwe	-Lack of government input -Employee knowledge deficiency -Employee resistance to change -Low management commitment to FSMS -Financial constraints	-Awareness among management increased -There is structured knowledge assessment -There is clear identification of barriers -There is room and potential for improvement	Nyoka et al (2023)
Indonesia	-There are knowledge gaps among employees especially general workers -manual documentation requirement of ISO 22000:2018 are difficult needing more effort complicating compliance for business. -Employee resistance to change -Technical skills shortages among workers	-Aid in competition advantage in the market -Management awareness among management User engagement and understanding FSMS requirements	(Adisusilo et al., 2024)
Iraq	-High cost of implementation of FSMS -Lack of management commitment	-competitive advantage -regulatory compliance	Alkhafaji and Herrera (2021)

	-Lack of adequate expertise with implementation knowledge -Lack of adequate infrastructure	-increased awareness to other companies leading them to also implement a FSMS	
Ghana	-Lack of awareness on food safety standards and their importance -financial limitations hindering the capacity of food small and medium business to implement FSMS. -Inconsistence food safety regulations and standards enforcement by Local authorities and government bodies leading to confusion and non-compliance among food industry. -lack of adequate infrastructure which also affects implementation of a FSMS. Training and education gaps in industry workers -cultural attitudes can cause resistance to change by producers hindering FSMS implementation	-increased awareness of FSMS by producers. -there establishments of clear policies and guidelines for food safety management have facilitated better understanding and implementations. -If goods are up to standard consumer demand also increases	Madilo et al., 2024

Syrian Arab Republic	-ISO 22000:2018 multifaceted nature can complicate the implementation process, usually in multiple production lines. -Adequate resources, time and financial investment are required for successful implementation which can be a barrier for some facilities. -Ensuring all workers are sufficiently trained in new standards and procedures is a significant challenge. -resistant to change by employees	Improved performants in all lines of production can be achieved. -Enhanced food safety and quality assurance. -increased market confidence is achieved. -systematic risk management which provides a structured framework for identifying and managing food safety risks effectively. -regulatory compliance to national and international standards.	Rihawi (2024)
Taiwan	-resistant to change of employees. -resources scarcity such as quality machines. -monitoring ongoing compliance and FSMS requires significant effort and effort.	-Increased efficiency in managing food safety risks. -improved food safety and quality assurance in the production process. - regulatory compliance to food standards increased.	Chen et al (2022)

Zimbabwe	-The intricate requirements of ISO 22000:2018 and HACCP can be overwhelming for organizations, especially those new to food safety management systems. -Limited financial and human resources can hinder the ability to fully implement the necessary systems and training. -There is often a lack of adequate training for employees, which can impact the effective implementation of food safety practices. -Employees may resist adopting new processes and practices required by the standards, leading to implementation challenges.	-implementation of ISO 22000:2018 and HACCP led to improved food safety and quality assurance in the production process. -The systems helped streamline operations and improve overall efficiency in managing food safety risks. -Certification boosted the competitiveness of the products in the market, enhancing consumer trust and confidence.	Kajongwe et al (2021)

2.3 REVIEW OF IMPLEMENTING A STANDARD

The first step starts with the establishment of a comprehensive framework that outlines the company commitment to food safety (Nguyen and Li, 2022). The framework includes the formation of food safety policies and objectives that suits both ISO 22000:2018 and the operational context of the organisation (Nguyen and Li, 2022). This step is important because it shows management commitment and leadership to organisational culture to food safety (Rincon-Ballesteros, 2021).

Followed by hazard identification and risk assessment of food processes and implementing HACCP principles to manage and control the risks effectively (Wahab, et al., 2022). This is also done by development of prerequisite programs that addresses the basic aspects of food safety such as personal hygiene, equipment maintenance, employee trainings and facility cleanliness (Vu, et al 2021), then continuous monitoring and evaluation using inspections and audits to assess compliance, non-conformities and areas that needs improvement (Vu, et al 2021). Lastly continual improvement is done and the circle continues thereby enhancing the company operational efficiency, product quality and increased food safety (Islam and Cullen, 2021; Vu, et al 2021).

2.4 FRAMEWORK DEVELOPMENT

Framework development for ISO 22000:2018 implementation involves a systematic approach that integrates existing knowledge best practices and empirical knowledge (Islam and Cullen, 2021; Vu, et al 2021). A framework serves as structural guides that outlines the necessary components, processes and resources required for effective implementation (Islam and Cullen, 2021; Vu, et al 2021). The main steps for framework development are defining the scope, identifying the

stakeholders, assessing existing practices and integrating feedback from various participants and sources (Vu, et al 2021).

Many frameworks exist which includes HACCP, Plan Do Check and Act (PDCA) cycle, Total Quality Management (TQM), Change Management Theory and Food Safety Culture Framework (FSCF). Each of these frameworks have their weaknesses and strengths which usually need to be considered when choosing which one to use in the beverage organisation of low- and middle-income countries settings (Vu, et al 2021).

2.6 THEORETICAL FRAMEWORK

2.6.1 PLAN-DO-CHECK-ACT (PDCA) CYCLE

The PDCA cycle stats with planning followed by conduction of the plan that's Do then checking and lastly acting and the cycle continues as shown below

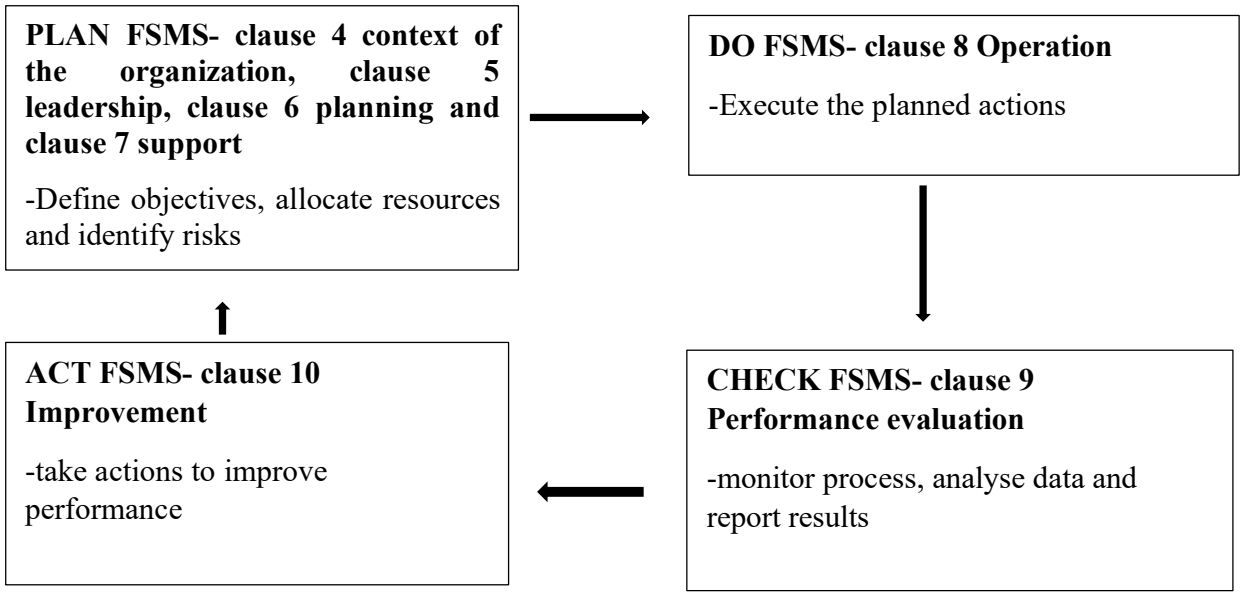


Fig shows PDCA cycle adopted from (ISO 22000:2018)

The PDCA cycle provides a systematic approach for continuous improvement in the food and beverage industries. In the planning phase organizations organisations establish food safety policies and objectives tailored to specific contexts. The do step is the implementation of the policies and objective phase. The check phase focusses on continuous performance monitoring and evaluating compliance through inspection and audits. Lastly the Act part emphasizes on making necessary corrections from the results from performance evaluation phase. This cyclical framework ensures that organisations can adapt and improve their FSMS over time (Kineber, et al., 2023; Pai, et al., 2024).

2.6.2 CHANGE MANAGEMENT THEORY (KOTTER'S 8 STEP CHANGE MODEL)

Change management theories, particularly KOTTER'S 8-Step Change Model, provide insights into managing organizational transformation during implementation:

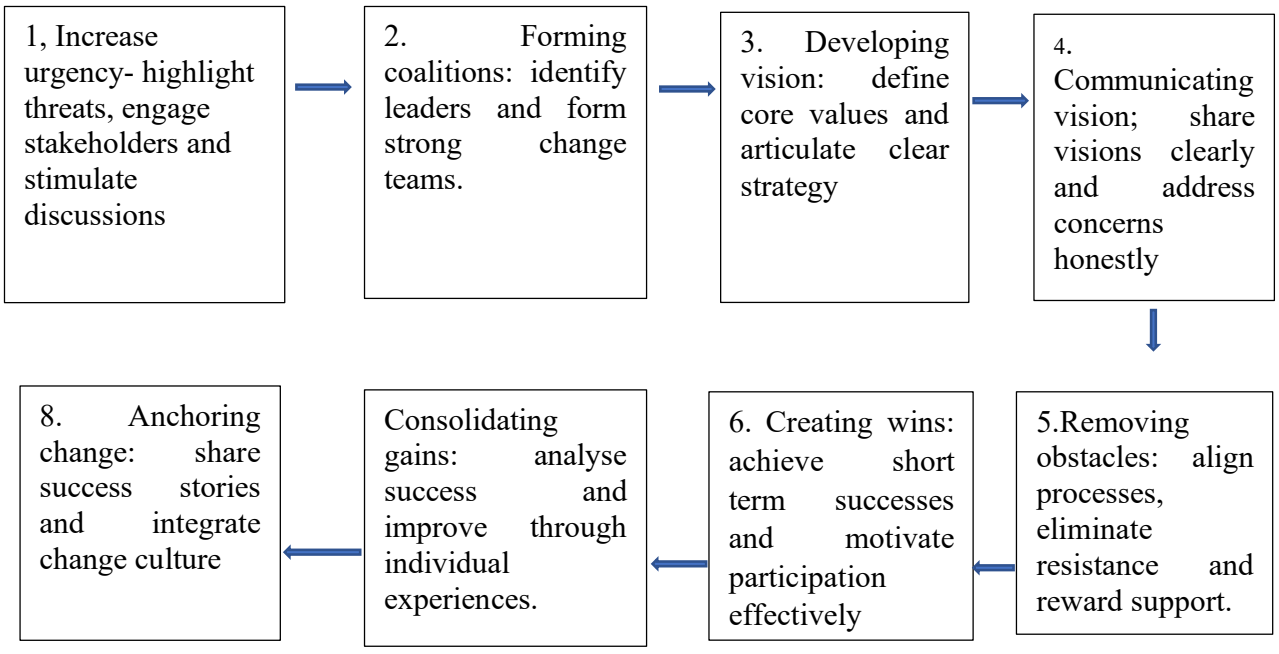


Fig 2.1 above showing Change Management Theory adopted from (Kotter, 1996) This model guides organisations in effectively managing the transformation required for successful ISO 22000:2018 implementation. This framework assists organisations to address employee resistance to change and fosters sense of ownership to all stakeholders. Clear communication leadership commitment and stakeholder engagement importance is emphasized throughout the Implementation process (Kulkov, et al., 2024). This framework combined with PDCA cycle acts as a guide to the development of the framework by the researcher.

2.7 SUMMARY

This chapter gives a comprehensive literature review of the implementation of ISO 22000:2018 in the beverage industry of LMIC. It highlighted implementation challenges and success from different countries belonging to LMIC such as Taiwan. The challenges include lack of resources, and lack of management support and success of production of quality products which are trusted by customers. The chapter discusses the existing frameworks such as PDCA cycle, HACCP, Total Quality Control and Change management theory highlighting their weaknesses and strength in implementation of ISO 22000:2018.

CHAPTER 3: METHODS AND MATERIAL

3. METHODS AND MATERIAL

3.1 DESCRIPTION OF THE STUDY AREA

The research was conducted at Prodairy's manufacturing facility in Ruwa (17.8967S, 31.2279E), Harare Zimbabwe (Fig.3.1). It is situated 22 km south east of Harare along Harare-Mutare Road. The area serves as a small administrative and trading center for the surrounding mixed farming area. The manufacturing facility operates multiple production lines for beverage products. It employs approximately 200 people who work in various departments (production, quality control, maintenance and administration).

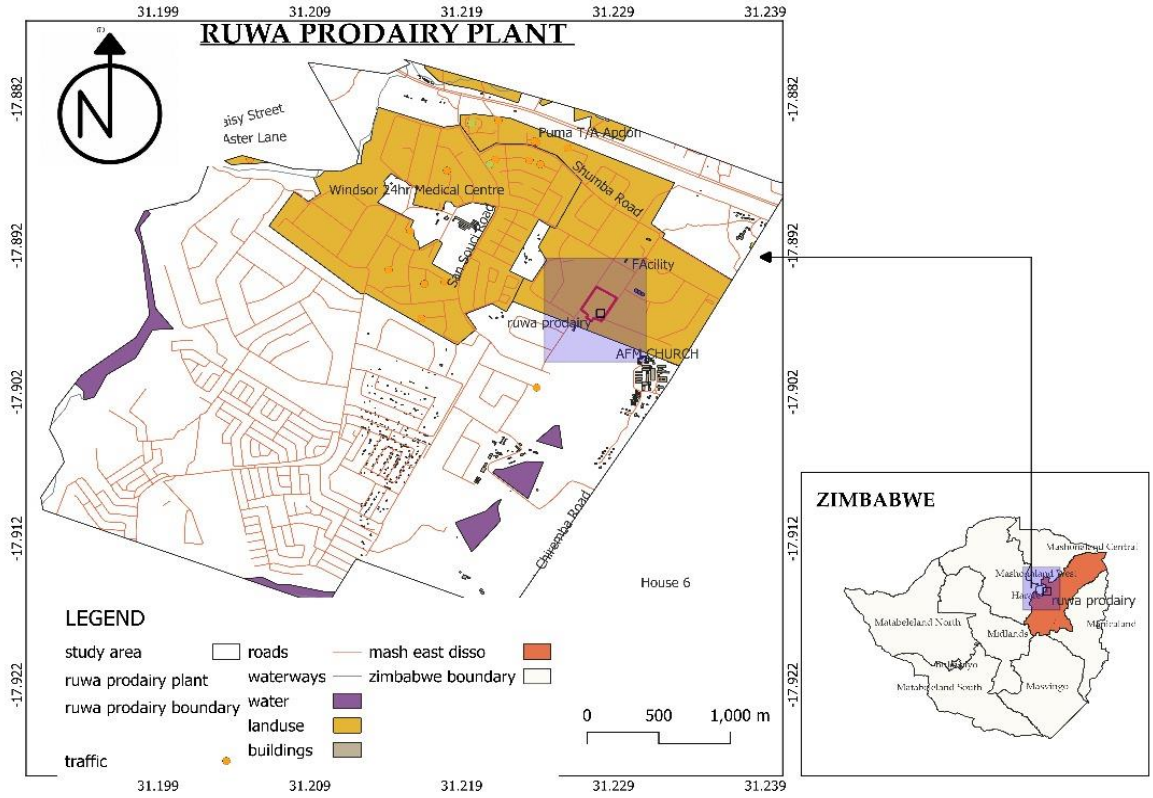


Fig 3.1. Map of Zimbabwe showing the location of Prodairy in Ruwa.

3.2 RESEARCH DESIGN

This study employed a mixed-methods case study design, combining quantitative and qualitative approaches to investigate the implementation of ISO 22000:2018 at Prodairy. A descriptive case study design approach was selected to enable in-depth examination of implementation processes, challenges and outcomes within the Zimbabwean beverage manufacturing context. The descriptive case study design approach offers a useful method for examining intricate, context-specific phenomena and identifying the challenges present in real life situations (Yin, 2020). Also, a review of relevant company documents was analyzed.

3.3 DETERMINATION OF SAMPLE SIZE AND RECRUITMENT OF PARTICIPANTS

Slovin's formula was used to determine the sample size as described by (Anugraheni et al., 2023) with a 95% confidence level:

$$n = N / (1 + Ne^2)$$

Where: n = sample size

N = 200 (total employee population)

e = 0.05 (margin of error)

Table 3.1. Determination of sample size and proportional allocation to departments

Department	N	N	% Sampling intensity
Production	114	76	66.7
Quality control	10	7	70

Maintenance	54	36	66.7
Administration	12	8	66.7
Management	10	7	70
Total	200	133	66.5

NB: Allocate the calculated 168 to departments based on their proportions to the total N (200),

e.g., For Production e.g., N = 114

Therefore, the proportion of the calculated n = 114/200 * 133 = 76

For in-depth key informant interviews, 20 key informants were purposively selected: four senior managers, six department heads, five food safety team members, three production supervisors and two worker representatives.

3.4 RESEARCH INSTRUMENTS

3.4.1 CLOSED-ENDED QUESTIONNAIRE

A closed-ended questionnaire (Appendix 1) was designed from literature based on ISO 22000:2018 requirements and validated instruments from previous studies (Roopa et al., 2012, Desai and Reimers, 2018, Escanciano and Santos-Vijande, 2020). The questionnaire comprised 34 questions in three sections. The closed ended questionnaire collected information on challenges and success factors and perceived effectiveness of the FSMS. The benefit of closed ended questionnaire is that it usually achieves data accuracy and easy to answer by participants so it is fast to understand (Roopa et al., 2012). However, it is difficult to in conveying feelings and emotions (Desai and Reimers, 2018). The questionnaire was designed in English language but where there was the need for clarity, ChiShona language was used.

3.4.2 FACE-TO-FACE SEMI-STRUCTURED IN-DEPTH INTERVIEWS

The interview guide (Appendix 2) was developed from literature (Saarijarvi and Bratt, 2021) to explore on the implementation of (Jain, 2021) experiences in depth, focusing on strategic planning processes, resource allocation decisions, implementation challenges, success factors, organizational change management and performance outcomes. An in-depth face-to-face interview gives more detailed information and it is easy to test for reliability (Jain, 2021). On the other hand, it is usually not flexible (Jain, 2021).

3.4.3 DOCUMENT REVIEW PROTOCOL

The document review protocol covered food safety policies and procedures, HACCP documentation, training records, audit reports, performance metrics and management review minutes to solicit information which assist in development of the FSMS implementation. Document review was carried out because it is cheap and save time and easy to access but it has a limitation of lack of control over the quality of data reviewed (Sindin, 2017).

3.5 ETHICAL CONSIDERATIONS

Prior to participating in the study, participants were informed about its purpose and the nature of their voluntary involvement, allowing them to make informed choices. The study ensured the anonymity and confidentiality of all shared information and participant identities by excluding names of participants, their phone numbers and addresses and limiting access to data to only the researcher and the supervisor (Montreuil et al, 2021). Approval for the research was obtained from the Department of Environmental Science at Bindura University of Science Education, as well as the safety department of the Prodairy PVT LTD through verbal consent.

3.6 DATA COLLECTION

3.6.1 CLOSED-ENDED QUESTIONNAIRE

Data collection for the closed-ended questionnaire was conducted using a structured instrument designed specifically for this study. The questionnaire, as detailed in Appendix 1, consisted of 34 questions divided into three sections. Each question was carefully formulated to gather information on the challenges and success factors related to the implementation of ISO 22000:2018 at Prodairy. The questionnaire was distributed to the 128 selected participants, who were stratified by department to ensure representative sampling. Data collection occurred over a period of two weeks, during which participants were invited to complete the questionnaire either in person or electronically. The use of SPSS version 26 and Excel facilitated the analysis of the collected data, allowing for regression analysis to evaluate correlations between challenges and successes in the implementation process.

3.6.2 FACE-TO-FACE INTERVIEWS

In-depth face-to-face semi-structured interviews were conducted with 10 key informants selected purposively. These included two senior managers, two department heads, two food safety team members, two production supervisors, and two worker representatives. The interviews aimed to explore the implementation experiences of ISO 22000:2018 in greater depth, focusing on strategic planning, resource allocation, challenges faced, and success factors. Each interview lasted approximately 20 to 30 minutes and was conducted in a private setting to ensure confidentiality and encourage open dialogue. Thematic analysis was employed to analyse the interview data, following the six phases outlined by Braun et al. (2012). This process involved familiarization with the data, generating initial codes, searching for themes, reviewing themes, and naming themes to produce comprehensive findings.

3.6.3 REVIEW OF LITERATURE WITH STANDARD FRAMMEWORK IMPLEMENTATION PROCEDURE

Systematic review of literature was done in order to be able generate new framework for ISO 22000:2018. The Systematic Review and Meta-Analysis (PRISMA) statement (Liberati et al., 2009). Systematic review was done through searching information from Google Scholar. Key words were used to search for information for example 'ISO Standard framework implementation'. Filters were applied including publication date, for the researcher to have documents which are suitable to collect information about ISO 22000:2018 Framework generation.

3.6.4 DOCUMENT ANALYSIS FOR PRODAIRY ISO 22000:2018 DOCUMENTATION

A document analysis protocol was established at Prodairy to review relevant internal documents that support the implementation of ISO 22000:2018 at Prodairy from 2019 up to May 2025. All relevant documents were identified, screened according to their relevance to the study, then assessed for eligibility. This analysis was conducted to provide additional context and corroborate findings from the questionnaire and interviews. The data was analyse using mixed methods appraisal tool (MMAT) adopted from Hong et al (2018). MMAT is used to identify the documents quality for the research. Scores ranging from 0 to 10 are used to rank each and every document from the company documents. The scores ranging from 0 to 3 meaning low quality document, 4 to 7 meaning moderate quality and 8 to 10 meaning high quality document. Only documents with score ranging from 8 to 10 were selected.

3.7 DATA MANAGEMENT

3.7.1 CLOSED ENDED QUESTIONNAIRE

SPSS was used to analyse closed ended questionnaire data using descriptive statistics data analysis tool (Williams 2022). Challenges and success were analyzed using Bloom's cut off points scoring method (Alzahrani et al., 2021). A score ranging from 80 to 100% was regarded as strong agreement for strong agreement response only, 60 to 79 as moderate agreement for strongly agreement response only and 0 to 59 as there is share of opinions for strongly agreement response only (Alzahrani et al., 2021). Blooms cut off points is suitable because it provides an insight of the agreement level of participants on different questions regarding ISO 22000:2018 implementation success and challenges (Alzahrani et al., 2021). It also helps to rank the level of strong agreements or disagreements which foster continuous improvement in the implementation process (Alzahrani et al., 2021).

3.7.2 FACE TO FACE INTERVIEW

Thematic analysis method which consists of six phases was used to analyse in-depth interview data (Braun et al 2012). The steps involved starts with data familiarization, generating initial codes, searching for initial codes, searching for themes, reviewing potential themes and naming themes to produce a result (Braun et al 2012). The tool was chosen because of its flexibility, accessibility and ease for new users. The disadvantage of this tool is that it is time consuming, and the result depends on the researcher's judgement (Braun et al 2012).

CHAPTER 4 RESULTS

4.1 PARTICIPANTS CHARACTERISTICS: IN-DEPTH INTERVIEWS

Table 4.1 shows demographic data of participants which answered in-depth interviews shows that the majority were male (61.5%) and all the participants have got tertiary education (100%).

Table 4.1. Demographic characteristics of in-depth interviews characteristics

Variable	Category	Frequency n (%)
	Male	8(61.5)
Gender	Female	5 (38.5)
Age	18-30	4(30.8)
	>30	9(69.2)
Department	Administration	10(76.9)
	SHE	3(23.1)
Education	Secondary	0(0)
	Tertiary	13(100)
Experience	<2 years	5(38.5)
	>2 years	8(61.5)

4.2 CHALLENGES OF IMPLEMENTING ISO 22000:2018 AT PRODAIRY, 2025

Table 4.2 shows the themes that emerged from the thematic analysis of challenges encountered by employees in implementing ISO 2200:2018. The results show that there was resistance to change 76.9%, Resource shortages and lack of training 100%.

Table 4.2 ISO 22000:2018 implementation key challenges themes found from in-depth interviews

Challenges key themes	Frequency %	Direct quotations from participants
Employee resistance to change	10(76.9)	*"Changing was really difficult especially for the old team of production and maintenance crew who saw it as a waste of time for them to learn new things of safety."*
Resource shortages and lack of training	13(100)	*"As a company which needs profits, the resource allocation to, SHE programs was short, the SHEQ team often lack required materials and time to conduct their activities."*
Inadequate training and Communication gaps between management and employees and lack of knowledge	8(61.5)	*"I once asked a general worker about the ISO 22000;2018 implementation and the worker replied that he just overhead through grapevine that the company is in the process of trying to implement a new way of manufacturing, which showed that there was no proper communication, knowledge disbandment and trainings, until we provided continuous improvement."*

4.3. SUCCESS STORIES OF ISO 22000:2018 IMPLEMENTATION

Table 4.3 shows the successes key themes. Results indicate that ISO 22000:2018 implementation has many successes including higher demand of pro dairy products nationwide and an increase in employee awareness which was mentioned by 100% of the participants.

Table 4.3 Key success's themes of ISO 22000:2018 implementation solicitated through in-depth interviews

Key success theme	Frequency %	Direct quotations from participants
Increased product demand	13 (100)	*"If you check the number of deliveries right now has increased meaning the company products are being trusted more than before when it has not yet implemented the ISO 22000:2018.*
Food safety increased employee awareness	13 (100)	*This Standard is a big deal if integrated by other standards, all the employees are now versed up and always aware"*
Sense of ownership of the ISO 22000:2018	9(69.2)	*All the employees are feeling to be the owners of the standard and feeling proud of their company by seeing how big it is becoming, the company products are all over in market competing well"*

4.4 PARTICIPANTS CHARACTERISTICS: QUESTIONNAIRE

Table 4.3 shows that there Out 128 participants 55.5% were male and 44.5% were female, 57% of the participants have got tertiary education at Prodairy and 71.9% are married.

Table 4.3 Characteristics of participants

Variable	Category	Percentage
Gender	Male	71(55.5)
	Female	57(44.5)
Age in years	18-25	30(23.4)
	26-35	32(25.0)
	36-25	30(23.4)
	>45	36(28.1)
Education	Secondary	54(42.2)
	Tertiary	74(57.8)
Marital status	Married	92(71.9)
	Divorced	5(3.9)
	Widowed	6(4.7)
	Single	25(19.5)
Position	Supervisor	4(3.1)
	Production personnel	58(45.3)
	Quality control	6(4.7)
	Maintenance workers	39(30.5)
	Administration	14(10.9)
	Other	7(5.5)

Years at Pro dairy	<1 year	23(18)
	1 to 3 years	37(28.9)
	>3 years	68(53.1)

4.3.2 CHALLENGES OF ISO 22000:2018 IMPLEMENTATION AT PRODAIRY

Table 4.4 shows the Challenges of ISO 22000:2018 implementation solicited using closed ended questionnaires. The results shows that there were worrisome challenges reported by 128 participants. Participants strongly disagree for all challenges except one of HACCP training where 66% agrees that there were not trained and only 24.2% disagrees that they were trained for HACCP. 60% disagrees that there was resistance to change by employees. The challenges scored as moderate agreement between participants (62.5%) using blooms cut off points.

Table 4.4 Average score of ISO 22000:2018 implementation challenges at Prodairy

Question	Strongly disagree %	Disagree %	Neutral %	Agree %	Strongly agree %	Score
There was a lack of financee for implementation	0	0	46.9	0	53.1	53.1
There was a lack of expertise for implementation	0	0	25	0	75	75
There was no commitment / support from management	0	0	6	21.9	71.9	71.9
There was expressed resistance to change from employees	0	60.2	13.3	0	26.6	26.6
Difficulties in understanding ISO 22 000:2018 were observed	0	0	10.9	50	39.1	39.1
The implementation phase did not go on as planned?	0	10.2	1.6	6.3	82	82
Employees were not trained in HACCP procedures	0	0	9.4	66.4	24.2	24.2
A lack of knowledge of ISO 22 000:2018 was established	0	0	10.9	50	39.1	39.1
The implementation stage was not effectively communicated	0	9.4	0	15.6	75	75
There was no committee responsible for implementation	0	7	0	6.3	86.7	86.7
There was no adequate record keeping or documentation	0	7	0	1.6	94.1	91.4
The implementation process negatively affected work flow	0	7	15.6	16.4	60.9	60.9
Implementation led to increased workload or stress	0	6.3	11.7	26.6	55.5	55.5
All employees were not consulted prior to implementation	0	3.1	0	2.3	94.5	94.5

Average score (blooms cut off points)	7.8	10.9	18.8	62.5	62.5

4.3.3 SUCCESS OF ISO 2200:2018 IMPLEMENTATION AT PRODAIRY

Table 4.5 shows that participants strongly agree that ISO 22000:2018 implementation have got many successes where 89.1% strongly agrees that its implementation enhances a competitive advantage in the food industry. and also 85.9% strongly agrees that Food safety management implementation inculcates a sense of safety at Prodairy as shown on the table.

Table 4.5 Average score of ISO 2200:2018 implementation success at Prodairy

Question	**Strongly disagree %**	**Disagree %**	**Neutral %**	**Agree %**	**Strongly agree %**	**Score**
Led to improved product quality	5.5	3.1	14.1	5.5	71.9	71.9
led to a reduction in food safety incidents	0	16.4	7	4.7	71.9	71.9
enhanced organizational reputation	7	5.5	4.7	0	82.8	82.8
enhanced organizational brand image	6.3	5.5	0	86.3	82	82
enhanced a competitive advantage in the food industry	5.5	3.1	0	2.3	89.1	89.1
Improved meeting regulatory requirements	0	5.5	3.1	3.9	87.5	87.5

boosted your moral at your workplace	6.3	0	3.9	8.6	81.3	81.3
inculcated a sense of safety at your workplace	7	3.1	0	5.5	85.9	85.9
Led to cost savings through reduced waste or spoilage	0	5.5	3.9	5.5	83.6	83.6
Enhanced your food safety knowledge and practice	14.8	0	5.5	4.7	75	75
Facilitated better communication/cooperation with others	0	16.4	6.3	4.7	72.8	72.8
Contributed to a stronger food safety culture within the organization	0	15.6	7.8	6.3	70.3	70.3
provided a framework for continuous improvement in food safety	4.7	3.9	0	7	84.4	84.4
You recommend implementing the standard to other food business organizations	5.5	0	2.3	3.1	89.1	89.1
Average score (blooms cut off points)	4.7	6.3	3.9	4.7	80.5	**80.5**

4.4 PRODAIRY ISO 22000:2018 DOCCUMENT REVIEW

Fig 4.1 shows 105 documents found after reviewing Pro dairy documentation. Results show that Prodairy is complying with the ISO22000:2018 documentation.

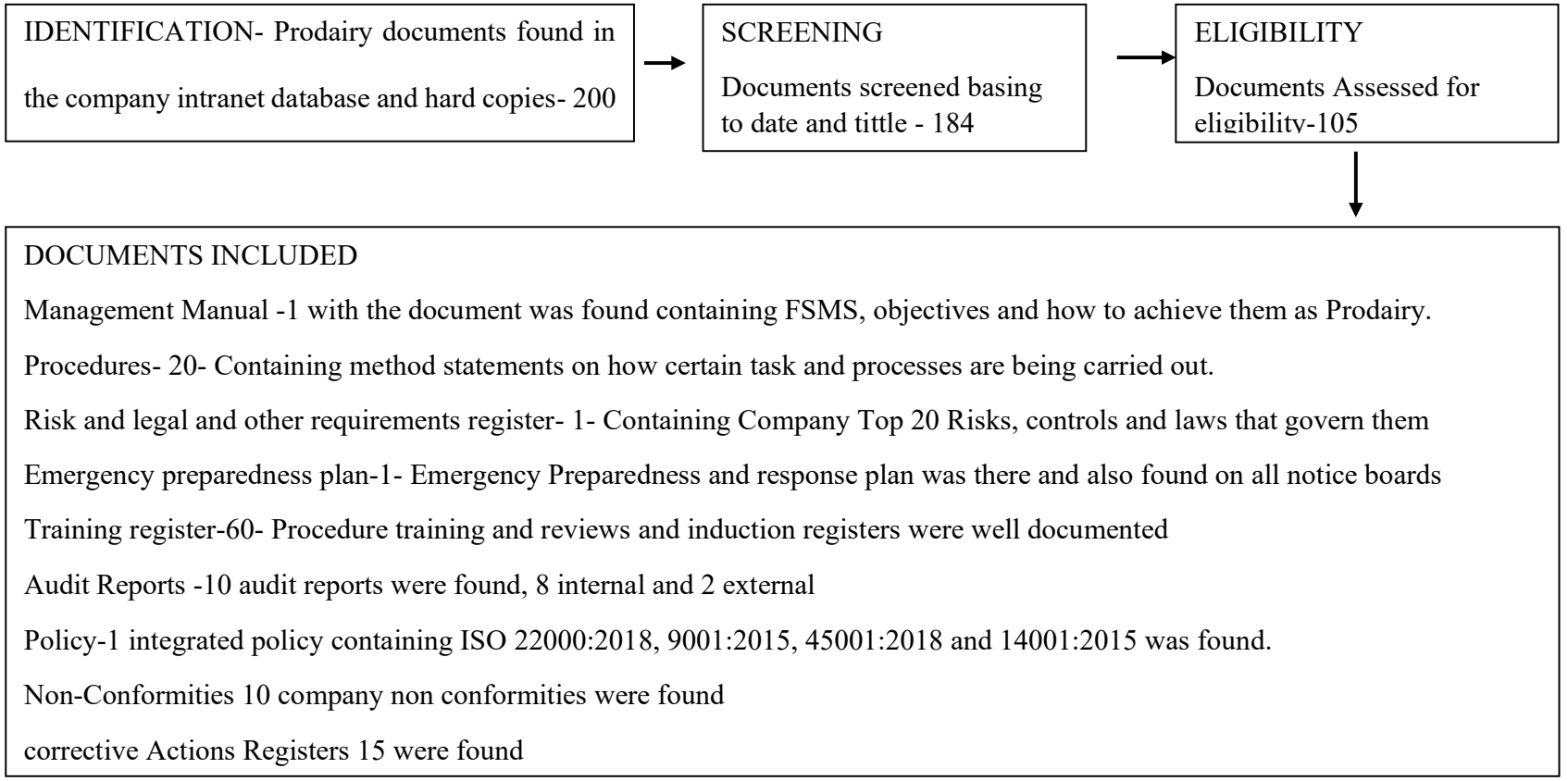
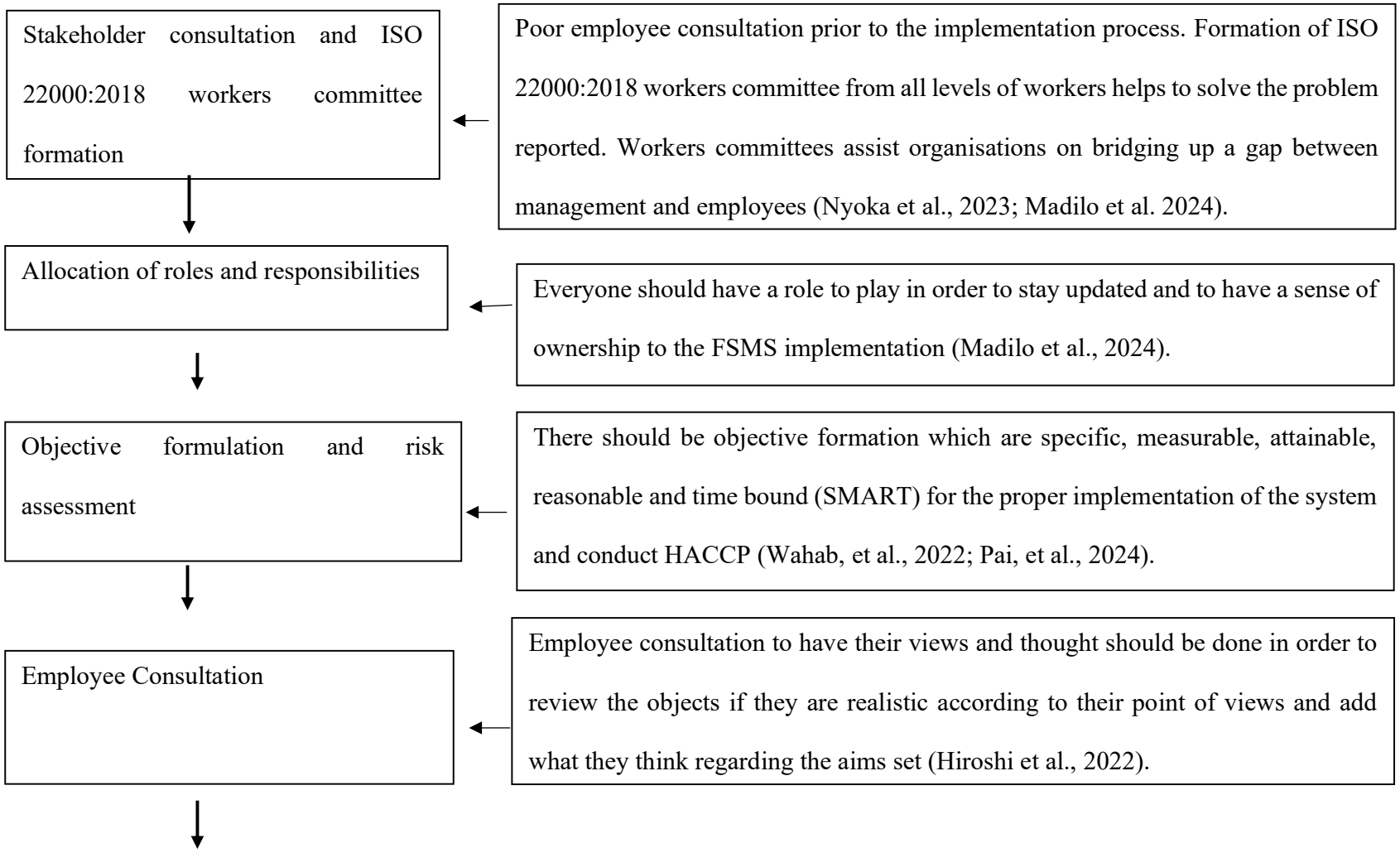


Fig 4.1 Systematic review flow diagram (adopted and modified from Liberati et al.2009)

4.5 AN ISO 22000:2018 FRAMEWORK DEVELOPED THROUGH EMPIRICAL FINDINGS SHOWED IN FIG BELOW


Stakeholder consultation and ISO 22000:2018 workers committee formation
Poor employee consultation prior to the implementation process. Formation of ISO 22000:2018 workers committee from all levels of workers helps to solve the problem reported. Workers committees assist organisations on bridging up a gap between management and employees (Nyoka et al., 2023; Madilo et al. 2024).
Allocation of roles and responsibilities
Everyone should have a role to play in order to stay updated and to have a sense of ownership to the FSMS implementation (Madilo et al., 2024).
Objective formulation and risk assessment
There should be objective formation which are specific, measurable, attainable, reasonable and time bound (SMART) for the proper implementation of the system and conduct HACCP (Wahab, et al., 2022; Pai, et al., 2024).
Employee Consultation
Employee consultation to have their views and thought should be done in order to review the objects if they are realistic according to their point of views and add what they think regarding the aims set (Hiroshi et al., 2022).

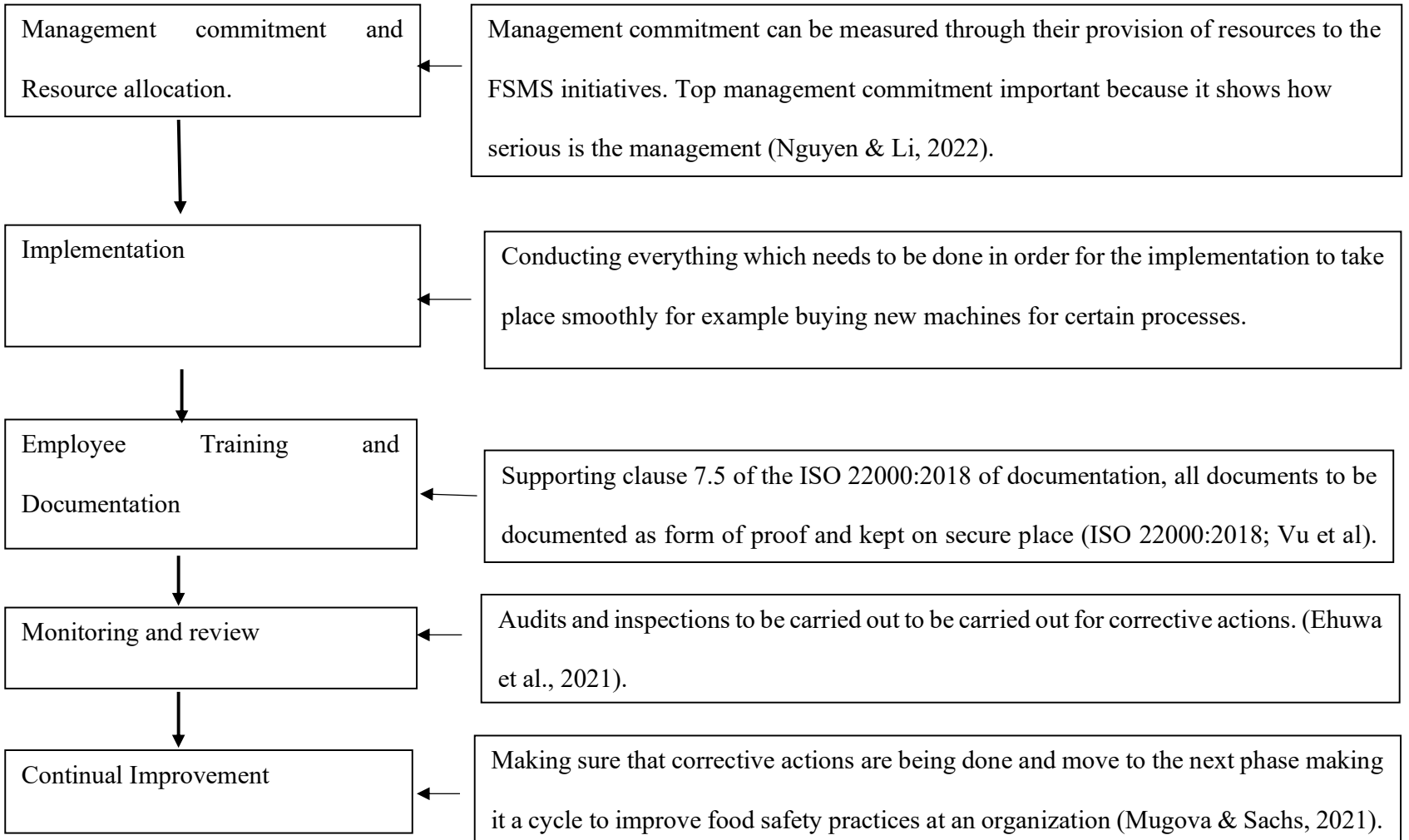


Fig 4.2 Framework for ISO 22000:2018 implementation. (Adopted from Glevitzky et al, 2025)

CHAPTER 5: DISCUSSION

5. DISCUSSION

5.1 INTRODUCTION

The chapter discusses the research findings on challenges and successes of the implementation of ISO 22000:2018 at Prodairy. The research uses systematic literature review of Prodairy ISO 22000:2018 implementation documentation, in-depth interviews and closed ended questionnaires to evaluate the challenges and successes faced during the implementation process and supporting with literature.

5.2 DEMOGRAPHIC INFORMATION OF PARTICIPANTS (IN-DEPTH INTERVIEW AND QUESTIONNAIRE SURVEY)

The demographic information shows that the participants were mainly male comprising of 55.5% for questionnaire participants and 61.5% for interview participants. Also, different age groups and educational levels which is consistent with other literature findings from previous researches showing that age group, educational levels and experience plays an important part in the training and acceptance of the new standard (Macheka et al.,2022).

The participants higher level of education where 57.8% of questionnaire participants and 100% in-depth interview participants have got tertiary education shows a potential for higher understanding and compliance with ISO 22000:2018 standard which supports the literature that put more emphasis on the positive benefit of having educated employees in the successful implementation (Adisusilo & Ikshan, 2024).

5.3 CHALLENGES AND SUCCESS OF IMPLEMENTING ISO 22000:2018 AT PRODAIRY.

The research findings shows that there were significant challenges and success in ISO 22000:2018 implementation at Prodairy. Notably the 66% questionnaire participants showed that they felt that they were not well trained in HACCP procedures, and also 61% of interview participants mentioned the issue of inadequate training of ISO 22000:2018 initiatives which also aligns with literature indicating that lack of training of employees regarding to ISO 22000:2018 implementation can cause resistance to change by employees (Chen et al., 2020; Rihawi, 2024). About 53% of questionnaire participants and 100% of in-depth interview participants indicated that there were finance constraints prior to ISO 22000:2018 implementation. Lack of finances and infrastructure to support ISO 22000:2018implementation causes resistance to change (Madilo et al. 2024).

Although there were challenges Prodairy recorded some successes such as increased product demand and enhanced ISO 22000:2018 awareness which was reported by 100% of in-depth interview participants and 89.1% of closed ended questionnaire participants. The successes shows that even though there was initial resistance to change, ISO 22000:2018 leads to long term benefits at Prodairy which was echoed in the literature highlighting the competitive advantage in the market and reduced work accidents due to increased awareness of employees (Kajongwe et al., 2021; Nyoka et al., 2023; Rihawi, 2024).

5.4 DOCUMENT REVIEW

Prodairy ISO 22000:2018 document review revealed a comprehensive collection of documents and records which supports FSMS implementation, which includes signed ISO standards

integrated policy and training documentation. This shows the important role of top management commitment which is crucial for the ISO 22000:2018 implementation (Kafetzopoulos & Gotzamani, 2020). The presence of well documented procedures at Prodairy shows that the company supports the advantages of adhering to FSMS (Zhou et al., 2021; Zindiye et al., 2022). Although training records were well documented, results from questionnaire and in-depth interview participants shows that there is a gap in employee to employer communication and employee involvement in ISO 22000;2018 implementation, Prodairy can b ridge the gap through including employees in decision making and transparency is needed.

5.5 FRAMEWORK STRENGTHS AND WEAKNESSES

The framework follows the Plan Do Check Act cycle. The framework allows an approach of systematic food safety management (Kineber, et al., 2023; Pai et al 2024). The strength of the framework is its applicability to local contexts combining both PDCA cycle and practical management tools such as HACCP. The framework reduces resistance to change which was reported in the findings of in-depth interview data and questionnaire data since there will be more employee participation and consultation. Resistance to change was also echoed in the literature as it comes from poor employee consultation and involvement (Chen et al., 2020; Rihawi, 2024). Another strength is that it promotes continual improvement.

Also, the framework has its disadvantage that its complexity where participants reported the difficulties in understanding ISO 22000:2018 frameworks requirements at Prodairy which also led to resistance to change which was reported by the participants and literature (Mhlanga et al., 2020).

5.5 LIMITATIONS TO THE STUDY

The study only focused on Prodairy settings which cannot represent the whole low and middle-income setting beverage industry challenges and successes on the implementation of ISO 22000:2018. Some questionnaire participants can just answer for the sake of finishing the questionnaire which can affect the results. The research was conducted over a limited period of time which hinder to observe long term challenges and benefits of ISO 22000:2018. These factors shows that the findings give an valuable results but the findings should be interpreted with caution since it can not fully capture the ISO 22000:2018 implementation in various organisations of low- and middle-income settings.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

6. CONCLUSION AND RECOMMENDATIONS

6.1 CONCLUSION

ISO 22000:2018 implementation of at Pro showed some challenges which includes resource scarcity, employee resistance to change butt with some good successes such as increased Pro dairy products demand in the market and an increased FSMS awareness. The results show the advantages of effective communication between employee and employer and employee training regarding the issues to do with ISO 22000:2018 in order to curb implementation challenges. The study is unique because it assists in understanding of ISO 22000:2018 implementation in Zimbabwe beverage industry sector, emphasizing the importance of employee consultation, effective communication and training. The future research need should look at the long-term effects of ISO 22000:2018in a wider range organisations in the food manufacturing industry.

6.2 RECOMMENDATIONS

According to the study, Prodairy is encouraged to:

- Prodairy management to prioritize resource allocation to ISO 22000:2018 implementation ensuring adequate employee training.
- Prodairy to establish clear communication channels that are compatible to all levels of workers. This can be done through increase in face-to-face meetings with all employees, massages sent to each and every employee phone, use of notice boards and feedback mechanisms.

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Appendix 1. Questionnaire

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Introduction

My name is Mutsigwa Tanaka S. I am a final-year student at Bindura University of Science Education (Registration No.: B211467B), pursuing a BSc (Hons) degree in Safety, Health, and Environmental Management (SHEM). As part of my academic requirements, I am conducting research titled "Implementation of an Occupational Health and Safety (OHS) Management System Based on ISO 22000:2018 at Prodairy PVT LTD: Empirical Evidence of Procedural Limitations and Success Stories." The study aims to assess the effectiveness of the implementation process, identify challenges, and highlight best practices that can enhance workplace safety and compliance. The findings will provide valuable insights for improving OHS management within the food industry. I invite you to participate in this study by sharing relevant information, provided you are willing to contribute.

Ethical statement

The study has been cleared by Bindura University of Science Education through the department of Environmental Science. Confidentiality and anonymity of shared information are guaranteed. By voluntarily participating in the study it implies that you understood its purpose and how you will be involved. This also means that you have provided your informed consent. If you feel that you wish to discontinue in the survey, please feel free to indicate it. It will take about 20 minutes of your time.

Signature: ……..... Date: …..…….. /2025

Instruction

Please encircle a bolded number indicating your response for each item.

Section A: Socio-demographic information

1. Gender:	**1**. Male	**2**. Female		
2. Age group: (years):	**1**. 18 - 25	**2**. 26 – 35	**3**. 36 – 45	**4**. > 45
3. Educational level:	**1**. None	**2**. Primary	**3**. Secondary	**4**. Tertiary
4. Marital status	**1**. married	**2**. Divorced	**3**. widowed	**4**. Single

5. Job position at Prodairy PVT LTD?

1. Supervisor

2. Production personnel

3.Quality control personnel

4. Other

6. Period you have been working at Prodairy (years): **1**. < 1 **2**. 1 - 3 **3**. > 3

Section B: ISO 22000: 2018 Implementation cchallenges

Put a cross/tick against the number corresponding to your response

Item	Statement	Response				
		5. Strongly agree	**4.** Agree	**3.** Neutral	**2.** Disagree	**1.** Strongly disagree.
7	There was a lack of financee for implementation					
8	There was a lack of expertise for implementation					
9	There was no commitment / support from management					
10	There was expressed resistance to change from employees					
11	Difficulties in understanding ISO 22 000:2018 were observed					
12	The implementation phase did not go on as planned?					
13	Employees were not trained in HACCP procedures					
14	A lack of knowledge of ISO 22 000:2018 was established					
15	The implementation stage was not effectively communicated					
16	There was no committee responsible for implementation					

17	There was no adequate record keeping or documentation					
18	The implementation process negatively affected work flow					
19	Implementation led to increased workload or stress					
20	All employees were not consulted prior to implementation					

.

Section C: Success stories

Put a cross/tick against the number corresponding to your response

Item	Implementation of ISO 22 000:2018:	Response				
		5. Strongly agree	**4**. Agree	**3**. Neutral	**2.** Disagree	**1**. Strongly disagree.
21	ed to improved product quality					
22	led to a reduction in food safety incidents					
23	enhanced organisational reputation					
24	enhanced organisational brand image					
25	enhanced a competitive advantage in the food industry					

26	Improved meeting regulatory requirements					
27	boosted your moral at your workplace					
28	inculcated a sense of safety at your workplace					
29	Led to cost savings through reduced waste or spoilage					
30	Enhanced your food safety knowledge and practice					
31	Facilitated better communication/cooperation with others					
32	Contributed to a stronger food safety culture within the organisation					
33	provided a framework for continuous improvement in food safety					
34	You recommend implementing the standard to other food business organisations					

Appendix 2. Face to face Interview questions

Part A, Demographic Information

1. Gender:

2. Age group: (years):

3. Educational level:

4. Marital status

5. Job position at Prodairy PVT LTD?

6. Period you have been employed by Prodairy PVT LTD?

Part B Challenges and success of ISO 22000:2018

1. In your opinion, what were the most critical success stories for implementing ISO 22000:2018 at your organisation?
2. What were the unavoidable challenges that you faced implementation ISO 22 000:2018 at your organisation?
3. From your experience, what is your Dos and DON'Ts message for a food business organisation intending to implement
   ISO 22 000:2018?