

**Food safety culture: A mixed method exploration of a prominent
wet condiment manufacturer in the Western Cape**

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DECLARATION

I, MONIQUE VISSER, identity number _____ and student number _____, do hereby declare that this research project submitted to the Central University of Technology, Free State for the Doctor of Philosophy in Environmental Health Sciences, is my own independent work; and complies with the Code of Academic Integrity, as well as other relevant policies, procedures, rules and regulations of the Central University of Technology, Free State; and has not been submitted before to any institution by myself or any other person in fulfilment (or partial fulfilment) of the requirements for the attainment of any qualification.

M. Visser

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I dedicate this work to my husband, André, and our son, André.

SUMMARY

Food safety continues to represent a significant global public health challenge, with the World Health Organization estimating that approximately 600 million people fall ill and 420 000 die each year from foodborne diseases. Regulation and scholarship have traditionally focused on high-risk commodities such as meat, poultry, seafood, and ready-to-eat foods. Condiments, however, despite their global consumption and potential to harbour microbial, chemical, and allergenic hazards, have received far less attention. In South Africa, condiment manufacturing constitutes both an important domestic industry and a growing export contributor, yet it is characterised by seasonal operations, limited resources, high staff turnover, and the pressure to align with international certification schemes such as FSSC 22000 and BRCGS. These challenges underscore the importance of cultivating a food safety culture (FSC) that extends beyond compliance to integrate safe practices within everyday behaviour. The overall aim of this thesis was therefore to investigate the structural barriers constraining FSC maturity within a wet condiment manufacturer in the Western Cape, South Africa, and to propose context-specific strategies to enhance resilience through leadership, communication, inclusivity, and innovation.

The objectives of the research study were to assess FSC maturity through a case study approach; conduct a narrative review on food safety assurance in the condiment sector and the role of organisational culture; perform a sequential explanatory mixed methods secondary data analysis of a survey questionnaire, interviews, focus groups, and an observational assessment; and apply design thinking to develop practical prototypes for strengthening FSC. Guided by research questions exploring structural barriers, leadership influence, and the value of design thinking, the research adopted a multi-paradigm framework integrating pragmatism, interpretivism, and critical theory. Pragmatism offered methodological flexibility, interpretivism enabled exploration of employees' lived experiences, and critical theory supported interrogation of systemic barriers shaping cultural practices.

A secondary data analysis design drew on a 2021 consultative project conducted within the selected organisation. Ethical clearance was obtained from the University of the Free State (UFS-HSD2024/1169), with permissions from both the consulting organisation and the manufacturer. The primary dataset included a survey questionnaire distributed to all employees ($n = 190$; 83% response rate), interviews with thirteen ($n = 13$) senior employees, twelve focus groups ($n = 12$) with 120 employees, and a structured observational assessment capturing 48 occurrences. Quantitative data were analysed through descriptive and comparative statistics, while qualitative data underwent thematic coding. Triangulation across datasets ensured integration of measurable indicators and lived experiences.

The narrative review outlined the evolution of FSC as a concept complementing food safety management systems (FSMS). Although standards such as Codex, HACCP, ISO 22000, and FSSC 22000 have advanced harmonisation, recurring outbreaks reveal the limits of technical compliance. Researchers including Griffith, Jespersen, Zanin, and Yiannas highlight that FSC is shaped by leadership, communication, transparency, and employee engagement. The review found minimal research on condiments, despite unique microbial, chemical, and allergenic risks, compounded in South Africa by infrastructural and regulatory constraints. Quantitative findings indicated strong employee commitment to food safety but inconsistent structural reinforcement. Vision scored highest (81%), while inspiration, empowerment, performance, and change appetite scored below maturity thresholds. Qualitative insights revealed limited leadership visibility, inconsistent recognition, poor communication, and symbolic rather than functional cultural artefacts. Observational findings supported variations between documented procedures and practice. Together, the findings highlighted committed employees constrained by systemic weaknesses.

Building on these insights, an adapted Stanford Design Thinking model translated findings into practical interventions. Through the Empathise, Define, Ideate, and Prototype stages, three prototypes emerged: Translated for Food Safety, promoting bilingual, visually accessible training; Cultural Artefacts of Food Safety, integrating visual cues into daily routines; and

Integrated Internal Audit: FSC Assessment and Sentiment Analysis, incorporating behavioural and emotional dimensions into compliance frameworks.

The research study concludes that FSC in condiment manufacturing depends less on technical systems than on reinforcing values and behaviours through leadership, communication, recognition, and inclusivity. Thus, it contributes theoretically by extending FSC research to an under-studied sector; methodologically by combining secondary mixed methods analysis with design thinking; and practically by offering adaptable prototypes to strengthen resilience. Limitations include the focus on a single manufacturer and reliance on secondary data, yet these open opportunities for comparative, longitudinal, and AI-enabled research. Ultimately, the dissertation supports that strengthening FSC requires a shift beyond compliance toward cultural transformation rooted in employees' lived experiences, offering pathways to build resilient food safety cultures and protect consumer health. Therefore, the research study advances the existing understanding in academic contexts and proposes considerations essential to the protection of consumer health.

Keywords: Food safety culture, condiment manufacturing, secondary data analysis, mixed methods research, organisational culture, design thinking, food safety management systems, narrative review, communication and employee engagement, South Africa

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LIST OF ABBREVIATIONS AND ACRONYMS

BRCGS	BRC Global Standards
CAC	Codex Alimentarius Commission
CAGR	Compound Annual Growth Rate
CGCSA	Consumer Goods Council of South Africa
COREQ	Consolidated Criteria for Reporting Qualitative Research
DALRRD	Department of Agriculture, Land Reform and Rural Development
DALY	Disability-adjusted Life Years
DOH	Department of Health
DTIC	Department of Trade, Industry and Competition
EFSA	European Food Safety Authority
EQUATOR	Enhancing the Quality and Transparency of Health Research
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FMCG	Fast-moving Consumer Goods
FSANZ	Food Standards Australia New Zealand
FSC	Food Safety Culture
FSMS	Food Safety Management System
FSSC	Food Safety System Certification
GAP	Good Agricultural Practices
GFSI	Global Food Safety Initiative
GMP	Good Manufacturing Practices
HACCP	Hazard Analysis Critical Control Point
HR	Human Resources
IFS	International Food Standard
IQR	Interquartile Range
ISO	International Organization for Standardization
NACMCF	National Advisory Committee on Microbiological Criteria for Foods
NASA	National Aeronautics and Space Administration

NPD	New Product Development
NRCS	National Regulator for Compulsory Specifications
PAS	Publicly Available Specification
PCA	Peanut Corporation of America
POPIA	Protection of Personal Information Act
PRP	Prerequisite Programmes
SANS	South African National Standards
SME	Small and Medium-sized Enterprises
SQF	Safe Quality Food
STROBE	Strengthening the Reporting of Observational Studies in Epidemiology
UFS	University of the Free State
WHO	World Health Organization

CHAPTER 1:

Introduction

1.1 BACKGROUND

A growing body of literature has studied food safety, regulatory frameworks, food safety management systems (FSMS), and the influence of human behaviour associated with food-related outbreaks. Research on food safety culture (FSC) is not a new phenomenon and has been evolving since the 2000's (Spagnoli *et al.*, 2025). Historically, food safety has been grounded in the fields of microbiology and public health, engaging both scientific and regulatory entities (Pai *et al.*, 2024; Powell *et al.*, 2011; Cavelius *et al.*, 2023). Griffith *et al.* (2010a) assert that food safety encompasses not only microbiological hazards but also behavioural aspects. Non-compliance with food safety protocols and management systems has been shown, through both public sector inspection reports and private sector audits, to carry significant consequences and to happen at varying levels across food manufacturing organisations. While some instances of non-compliance may only affect product quality, others can create serious food safety risks, with organisations linked to outbreaks facing severe brand damage, financial losses, and even the possibility of bankruptcy (Griffith, 2000).

Empirical research demonstrates that leadership approaches, resource constraints, and communication breakdowns are key factors shaping FSC (Nayak & Waterson, 2017). While existing results have not yet been translated into pragmatic, sector-specific frameworks, important limitations remain in their application. The present study identified no tools specifically developed or validated for condiment manufacturing environments, and no approaches that sufficiently address the operational realities of seasonal or fluctuating workforces. This research study directly addresses this shortcoming by conducting a secondary analysis of mixed methods findings, integrating existing data sources to design a tailored framework for strengthening FSC interventions within a wet condiment manufacturing organisation.

1.1.1 Food Safety

Food safety is a global priority, as the consumption of unsafe food presents serious risks to public health (World Health Organization, 2015). Food is not only fundamental to human survival and

well-being but also central to the global economy, cultural traditions, and social connections. Nevertheless, despite decades of investment in governance, infrastructure, and surveillance, outbreaks of foodborne illness persist. When food safety protocols are not upheld, food that sustains life can also become a source of risk, contributing to hazards and even fatalities (Seward, 2003). The World Health Organization (2015) has emphasised the urgent need for foundational changes in global food systems to ensure that safe, nutritious, and sustainable food is accessible to all populations. Each year, foodborne diseases are estimated to affect nearly 600 million individuals worldwide and contribute to 420 000 deaths. At the same time, the food industry is confronted with increasing challenges related to sustainability, climate change, and supply chain management; factors that are closely interconnected. Addressing these topics requires a collective focus on both food consumption and delivery across the global food supply chain (Webb & Morancie, 2015).

Research efforts have increasingly concentrated on measuring the global burden of foodborne disease, with the World Health Organization's Global Burden of Foodborne Disease study highlighting both the health and economic consequences of consuming unsafe food (Wu & Rodricks, 2020). The literature addresses food safety across a wide range of categories, including processed meat, deli meats, ready-to-eat foods, peanut butter, nuts, fresh produce, and seafood (Wu & Wallace, 2025). By contrast, condiments, despite being widely consumed as flavour enhancers, have received far less scholarly attention. Condiments are designed for shelf stability, traditionally achieved through vinegar-, salt-, or sugar-based preservation. Although used since ancient times and commonly added to a wide variety of foods, condiments have increasingly been recognised as potential vehicles of foodborne illness outbreaks when contaminated with pathogenic microorganisms (Thanh *et al.*, 2017).

The literature offers a range of definitions and interpretations of food safety. In broad terms, food safety is described as the prevention of foodborne illness through effective systems, behavioural norms, and organisational values (Lin & Roberts, 2020). Seward (2003) noted that understandings of food safety vary among stakeholders; including industry leaders,

governments, regulators, researchers, and consumers, since these perspectives are shaped by context and competing priorities. Raspor (2008) goes on to argue that the absence of a universally accepted definition has created barriers for regulatory frameworks, private standards, and academic discourse (Lamm *et al.*, 2020; Raspor, 2008). Table 1.1 summarises the definitions identified in the literature.

Table 1.1. Key Food Safety Definitions

Source	Definition Focus	Key Emphasis
American Academy of Microbiology (1999)	Specification of hazard limits (chemical, physical, microbial)	Technical threshold: Food safety as a standard requiring management beyond production
FAO (2003)	Food safety's impact on agriculture, trade, and health	Global coordination: Food safety as a global issue necessitating international cooperation
Seward (2003)	Food safety during manufacturing	Operational control: Food safety as practices to minimise foodborne illness during production
WHO (2006) / Codex Alimentarius (2022)	Assurance of food safety if food is appropriately prepared and consumed	Public health: Food safety as protection achieved through safe preparation and consumption
Raspor (2008) / Borchers <i>et al.</i> (2010)	Risk minimisation within expected usage	Risk-based approach: Food safety as prioritising consumer health through risk assessment
Baert <i>et al.</i> (2011)	Food safety across manufacturing processes	Holistic system: Food safety as system-wide protection

		aligned with product conditions
Manning (2017) / Australian Institute of FS	Accurate food handling and legislative regulation	Legal compliance: Food safety as meeting regulatory standards and ensuring proper management
Dora-Liyana <i>et al.</i> (2018)	Food safety across production and consumption stages	Integrative view: Food safety as linking nutrition, consumer acceptability, and global public health

As food safety concerns increasingly shape industry priorities, organisations that proactively adopt preventive measures and align with evolving regulatory frameworks are better positioned to uphold a strategic advantage. The future of food safety appears to require more than regulatory compliance alone (da Cunha *et al.*, 2025a). While documented procedures, standards, and control systems provide an essential foundation, they do not in themselves ensure that food safety is consistently prioritised in daily practice. In increasingly complex food systems, the effectiveness of formal requirements depends largely on how they are interpreted, implemented, and sustained within organisations. Several high-profile incidents have shown that failures can occur despite the presence of adequate procedures, suggesting that written systems and lived practice do not always align (Wu & Wallace, 2025). For this reason, food safety should also be understood as a function of organisational values, individual behaviours, and leadership commitment. The extent to which leaders actively reinforce expectations, model accountability, and allocate resources shapes how food safety is taken across all levels of the organisation. Ultimately, food safety is not defined only by documented procedures, but by the shared commitment and everyday decisions that give those procedures meaning in practice.

1.1.2 Regulatory Frameworks

Globally, comprehensive regulatory frameworks govern food safety to protect both public health and economic stability. These frameworks provide systematic guidance for organisations to align their policies with public health objectives, strengthening accountability from leadership through to frontline workers (da Cunha *et al.*, 2025a). Through the requirement of documented evidence of commitment, they encourage organisations to move beyond reactive compliance and towards a more proactive and integrated FSC.

Historically, food safety regulations were developed within individual regulatory sectors, often leading to legal inconsistencies across regions. A significant shift began in the 1960s with the introduction of Hazard Analysis Critical Control Points (HACCP), developed by NASA, Pillsbury, and United States military laboratories to safeguard food for space missions. In 1989, the United States National Advisory Committee on Microbiological Criteria for Foods (NACMCF) formalised HACCP through the establishment of seven principles (Burgess *et al.*, 2023). This framework was soon adopted internationally, with both the Codex Alimentarius and the European Union (EU) integrating HACCP-based hygiene regulations between 1993 and 1994 (Codex Alimentarius, 2023). A further milestone was reached with Directive 93/43/EC (EU), which introduced formal hygiene requirements for food manufacturing, emphasising hazard identification, critical control points, and systematic processes.

During the 2000s, European regulation advanced towards greater harmonisation through Regulation (EC) 178/2002, which established the European Food Safety Authority (EFSA) and introduced core principles such as consumer protection, transparency, risk analysis, and traceability (D'Amore *et al.*, 2025). This foundation was expanded through Regulations 852–854/2004, which extended the scope of food safety to include allergen management, redistribution practices, and the formal integration of FSC. These developments broadened oversight to cover the entire supply chain, from primary production and animal feed to official controls, reflecting a holistic “farm to fork” approach (D'Amore *et al.*, 2025). These regulatory developments are particularly relevant to South African manufacturers engaged in export

markets, where alignment with EU standards influences compliance expectations and food safety practices within the local manufacturing environment (Republic of South Africa, National Department of Agriculture, 2023).

Third-party certification schemes and quality assurance programmes have become essential compliance mechanisms within the global food supply chain, designed to improve oversight and standardise practices (Henson & Caswell, 1999). The proliferation of such schemes reflects a broader shift towards risk-based approaches and illustrates how international standards have reinforced regulatory oversight. Collectively, these developments highlight the food industry's global response to evolving challenges and emerging threats. That said, certification alone cannot guarantee a strong FSC, as audits primarily verify documented compliance at specific points in time. They do not necessarily reflect how food safety is prioritised in everyday practice or how competing pressures are managed. A strong FSC therefore depends on the extent to which food safety values and expectations are consistently integrated in organisational behaviours and leadership commitment.

1.1.3 Integrated Approaches to Food Safety Management Systems

As foodborne outbreaks have persisted, the industry's focus has shifted towards implementing FSMS that move beyond regulatory compliance, encouraging global harmonisation efforts and the widespread adoption of private certification schemes and standards. These private standards offer structured guidance on hazard identification, risk management, hygiene and sanitation practices, documentation, and auditing procedures, thereby reinforcing consistency and accountability across the supply chain (Frankish *et al.*, 2023). FSMS operate within an evolving framework that integrates organisational culture, leadership, and human factors. They function as a cornerstone of both food safety and regulatory alignment, combining policies, procedures, and practices that address technical controls alongside behavioural expectations. A significant development came in 2018 when the Global Food Safety Initiative (GFSI) issued a position paper that laid the foundation for culture-focused food safety initiatives. This paper

highlighted leadership commitment, employee engagement, communication, and shared values as critical enablers of food safety performance (GFSI, 2018).

The primary aim of FSMS is to ensure that food products are safe for consumption through the organised identification, evaluation, and control of hazards. In doing so, FSMS plays a critical role in supporting organisations to meet and maintain regulatory requirements (Manning & Grant, 2025). By implementing an FSMS, organisations can adhere to these regulatory requirements, mitigate risks, and maintain access to competitive markets (Henson & Humphrey, 2010). As consumer concerns over food quality and safety continue to grow, a robust FSMS can act as a competitive advantage, signalling an organisation's commitment to safeguarding food and strengthening consumer trust and loyalty (Jespersen & Wallace, 2017). Within food manufacturing, the effectiveness of FSMS is shaped by organisational culture, but translating food science into actionable management practices remains a complex and resource-intensive task (Jespersen *et al.*, 2018; Powell *et al.*, 2011). Achieving full regulatory compliance often presents challenges (Azanza & Zamora-Luna, 2005; Gilling *et al.*, 2001), leading organisations to adopt a range of strategies, including food safety audits, employee training, evaluation of management systems, and government-led food analysis to strengthen FSMS implementation (Osaili *et al.*, 2023; Taha *et al.*, 2020).

The recurrence of product recalls and foodborne illness outbreaks suggests that many existing FSMS remain insufficient (Nyarugwe *et al.*, 2016). A critical weakness lies in top management's limited recognition of the behavioural dimensions of food safety, which demand consistent and high-impact monitoring. Zook and Allen (2016) reported that up to 94% of organisational failures can be attributed to top management, who hold responsibility for resource allocation and the initiation of food safety systems (Herrero *et al.*, 2002). Although leadership often signals a commitment to food safety, the failure to enforce appropriate behaviours frequently results in protocol gaps and increased outbreak risks (Scallen *et al.*, 2011; Tam *et al.*, 2011).

1.1.4 Theoretical Framework for Understanding Food Safety Culture

Recent literature increasingly identifies FSC as a critical determinant of food safety performance within manufacturing organisations (GFSI, 2018; Zanin *et al.*, 2021; Frankish *et al.*, 2023). Nyarugwe *et al.* (2020) describe culture as an evolving, multidimensional construct, deeply embedded in both organisational systems and the broader national context in which an organisation operates. More broadly, culture can be understood as a system of shared values, norms, and behaviours within a group (Powell *et al.*, 2011). In relation to food safety, culture shapes how individuals perceive risk, comply with procedures, and prioritise hygiene, often extending its influence beyond what is captured in formal documentation or management systems.

1.1.5 National Culture

National culture has been described as the “collective programming of the mind” that distinguishes one nation from another. It shapes how employees interact with authority, respond to regulation, manage ambiguity, and approach decision-making. Hofstede’s (2001) cultural framework outlines six key dimensions that affect organisational behaviour, including food safety practices. Power distance reflects the degree to which differences in hierarchy and authority are accepted within a society. In cultures with high power distance, decision-making is typically centralised, while in those with lower power distance it is more consultative and distributed. Similarly, the dimension of individualism versus collectivism highlights key contrasts: individualist cultures place greater emphasis on personal goals and autonomy, whereas collectivist cultures prioritise shared accountability and loyalty to the group (Soares *et al.*, 2007; Zhang *et al.*, 2025). Masculine cultures are often characterised by competitiveness, assertiveness, and a focus on achievement, whereas feminine cultures emphasise collaboration, empathy, and interpersonal development. The dimension of uncertainty avoidance reflects the extent to which a society tolerates ambiguity and risk, with high uncertainty avoidance cultures more inclined to enforce prescriptive norms and detailed protocols (Hofstede, 2001). Long-term orientation captures whether a culture value sustains commitment and forward planning, as

opposed to short-term orientation, which prioritises immediate outcomes and traditional practices.

Finally, indulgence versus restraint distinguishes cultures that allow relatively free gratification of desires from those that regulate behaviour through social norms and self-discipline. Hofstede's dimensions provide a useful lens for considering how national culture may influence the development of FSC. For example, in higher power-distance contexts, hierarchical structures may affect employees' willingness to question decisions or report concerns, whereas lower power distance may facilitate more open communication. Similarly, higher uncertainty avoidance may reinforce strict adherence to procedures, while lower uncertainty avoidance may allow greater reliance on discretion. Such tendencies do not determine behaviour, but they may shape authority relations and risk perception in ways that influence how FSC is interpreted and enacted in practice (Nyarugwe *et al.*, 2020; Soares *et al.*, 2007; Zhang *et al.*, 2025).

1.1.6 Organisational Culture

Organisational culture is commonly understood as the system of shared norms, values, beliefs, and practices that guide employee behaviour and shape interactions within the workplace (Rasak, 2022). Nyarugwe *et al.* (2020) emphasise that organisational culture plays an essential role in either enabling or constraining food safety practices, particularly through the support systems that underpin food safety and hygiene. In food manufacturing, this culture is strongly shaped by leadership commitment, the quality of internal communication, the effectiveness of employee training, and the clarity of assigned responsibilities. Collectively, these elements create the organisation's internal climate, which in turn determines both the resilience and the maturity of its FSC (Frankish *et al.*, 2023). Moreover, organisational culture functions as a bridge between national influences and individual behaviours in the workplace. Even when formal FSMS are established, their effectiveness relies on the extent to which employees internalise and consistently practise them - a process shaped largely by organisational norms and leadership behaviour. Culture therefore reflects the enabling conditions that strengthen

employee engagement with food safety, including access to technological support, a clearly communicated food safety vision, and structured programmes that reinforce safe practices.

1.1.7 Food Safety Culture

FSC has emerged as a central concept in food safety research, defined through multiple lenses that encompass behavioural, organisational, and systemic processes. It is now widely recognised as a critical determinant of food safety performance, particularly as conventional management systems on their own have proven insufficient to prevent outbreaks (Pai *et al.*, 2023, da Cunha *et al.*, 2025a). Early work by Griffith *et al.* (2010b) defined FSC as the shared attitudes, values, and beliefs that shape food safety behaviours, positioning it as a learned phenomenon embedded within organisational culture. Building on this foundation, Sharman *et al.* (2020: 16) described FSC as a “long-term construct at the organisational level,” rooted in established attitudes and behaviours that directly influence food safety performance. The GFSI further frames FSC as the “shared values, beliefs, and norms that influence attitudes and behaviours regarding food safety within an organisation,” presenting it as both a compliance requirement and a defining organisational attribute (GFSI, 2018: 9). Nyarugwe *et al.* (2020) advances this perspective by emphasising that FSC extends beyond internal organisational factors such as employee attitudes and technical support to encompass external influences, including national values and governance structures. Yiannas (2009) further distinguishes FSC from FSMS, noting that while FSMS provide the procedural framework, FSC captures the human behaviours that ultimately determine their effectiveness. This distinction is extensively acknowledged in the literature, which highlights FSC as the collective attitudes, values, and beliefs shared by both employees and leadership. Collectively, these definitions position FSC as a multidimensional and evolving construct. Whereas earlier models concentrated on individual behaviours and internal attitudes, contemporary frameworks increasingly integrate structural, contextual, and environmental dimensions (da Cunha *et al.*, 2025a).

In organisations that demonstrate a strong FSC, senior management actively commits to food safety by allocating resources, ensuring adherence to practices, and maintaining a consistent

focus on food safety objectives. By contrast, organisations with a weak or negative FSC often balance compliance against competing priorities (Griffith *et al.*, 2010a). Yiannas (2009) states that a strong FSC reflects a deliberate organisational choice, driven by the responsibility to safeguard both consumers and employees. Achieving this requires that food safety be prioritised above cost-reduction measures or other operational goals (Griffith, 2010). The concept of FSC has been further developed by Jespersen *et al.* (2016), Nyarugwe *et al.* (2016), and Sharman *et al.* (2020), who describe it as the intersection of scientific and organisational expressions of human behaviour. The application of social cognitive theories such as risk perception, the illusion of control, and optimistic bias offers valuable viewpoints into the human factors shaping food safety decisions (De Boeck *et al.*, 2016). Prior research has identified several determinants of behaviour in food safety contexts, including leadership influence, cultural diversity, risk awareness, organisational commitment, and the organisational environment (Pai *et al.*, 2024; Spagnoli *et al.*, 2025). From this behavioural perspective, leadership consistently emerges as a central driver in integrating food safety values across organisational processes.

1.1.8 Key Influencers of Food Safety Culture

Multiple factors contribute to the evolution of FSC within an organisation (da Cunha *et al.*, 2025b). Among these, leadership commitment is recognised as a critical driver in shaping organisational values, ensuring consistency, and prioritising sanitation practices. In food manufacturing, leadership visibility and behaviour play a fundamental role in influencing organisational culture by modelling expectations, aligning daily responsibilities with food safety objectives, and encouraging shared attitudes (Wu & Wallace, 2025; da Cunha *et al.*, 2025a; GFSI, 2018). Effective leadership advances food safety beyond compliance checklists by integrating it into everyday practices and employee mindsets. At the same time, the organisational environment, including infrastructure and workplace demands, shapes whether safe practices are both practical and consistently applied. While structured systems such as FSMS provide essential foundations, FSC cannot be reduced to procedural plans or audit requirements (da Cunha *et al.*, 2025a). Rather, a strong FSC develops when leadership, FSMS, and behaviours

engage continuously, and are sustained over time through ongoing improvement rather than once-off compliance efforts.

According to Spagnoli *et al.* (2025), key behavioural drivers of FSC are rooted in its human–organisational dimensions. Employee behaviour is not simply the outcome of technical knowledge or training but emerges from the structural interplay of cultural norms and organisational processes. Behavioural consistency is further shaped by employees’ perception of risk, their emotional and procedural commitment to food safety goals, and the organisation’s capacity to adjust to changing conditions (Nayak & Waterson, 2017; Nyarugwe *et al.*, 2016). Transformational leadership is characterised by vision setting, proactive support, and relationship building and has been shown to have a stronger influence on hygiene behaviours than transactional, compliance-driven approaches (Taha *et al.*, 2025). This leadership style promotes emotional commitment, transparency, and collective engagement, integrating food safety into decision-making at all organisational levels. Leadership therefore operates not only as a managerial mechanism but also as a behavioural catalyst, enabling a resilient FSC even in the absence of inspections or audits.

Although a significant portion of FSC narrative has centred on compliance protocols and interventions, its unique value lies in the additional benefits these efforts can generate. Jespersen (2019) explains that organisational culture provides value beyond certification requirements by cultivating environments where food safety is included as a shared and deeply held value. More broadly, the literature is shaped by both science and academia and positions FSC as an evolving paradigm that integrates structural, behavioural, and strategic dimensions to encourage safer and more resilient food systems (Frankish *et al.*, 2023; Nayak & Waterson, 2017).

1.1.9 Shifting Paradigms in Food Safety Culture and Compliance

The progression of FSC compliance represents a shift in the global food sector, moving from procedural control to a behavioural and cultural paradigm. Initially grounded in FSMS,

compliance was largely regulatory and systems-driven. More recent literature highlights a transition toward organisational maturity, where leadership responsibility, employee engagement, and shared values collectively reinforce effective food safety outcomes (Pai *et al.*, 2024). Frankish *et al.* (2023) illustrate this evolution by demonstrating how FSC has been integrated within both regulatory frameworks and private standards, showing that the formalisation of culture strengthens accountability and directly links behavioural norms to performance outcomes.

The importance of developing a positive FSC is now extensively recognised by major regulatory bodies, including Codex Alimentarius, the GFSI, BRCGS, ISO 22000, and national governments, with FSC increasingly aligned as a core element of food safety audits (Ferreira *et al.*, 2025; Zanin *et al.*, 2022; GFSI, 2018). Although empirical research on FSC only began to surface in 2012, scholarly attention expanded following the GFSI position paper of 2018, which acknowledged that technical compliance alone was insufficient to safeguard food safety across global supply chains and emphasised the need for FSC to be integrated within organisational values, beliefs, and daily practices, regardless of organisational size. This recognition was reinforced when, in 2020, the GFSI updated its benchmarking requirements to mandate FSC integration across all recognised certification programmes and private standards. Brand Reputation through Compliance Global Standards (BRCGS) was the first to translate this into practice, introducing FSC requirements in Issue 8 of its Global Standard for Food Safety in 2018, which called for structured plans to drive continuous cultural improvement, a commitment further synthesised in Issue 9 (BRCGS, 2018; 2020).

Current industry and regulatory frameworks repeatedly prioritise leadership as a central component of FSC. The GFSI (2018) incorporated leadership into its five fundamental aspects, emphasising commitment, communication, and shared values, while the Codex Alimentarius identifies “management commitment” as essential for effective food hygiene systems (FAO, 2021), in line with EU Regulation 2021/382 and PAS 320 recommendations (Pai *et al.*, 2024; British Standards Institution, 2023; da Cunha *et al.*, 2025a). Together, these frameworks support

that sustainable FSC rely not only on procedures but also on leadership-driven implementation and alignment with organisational values (GFSI, 2023).

1.1.10 The Role of Food Safety Culture in Foodborne Outbreaks

Despite the presence of extensive regulatory frameworks and third-party certifications, foodborne outbreaks continue to occur. While both authorities and industry increasingly acknowledge the importance of FSC, outbreak investigations often remain focused on pathogens and technical controls, overlooking the cultural root causes that contribute to unsafe practices (Wu & Wallace, 2025). Research demonstrates how leadership oversight can normalise unsafe behaviour within teams, reinforcing the risk of failure when cultural accountability is absent. These findings illustrate that formal FSMS cannot be sustained without active leadership engagement and the incorporation of cultural responsibility throughout the organisation (Johnson, 2022; Pennington, 2009; Powell *et al.*, 2011).

Powell *et al.* (2011) studied three major outbreaks, namely Peanut Corporation of America (PCA), Maple Leaf Foods, and John Tudor & Sons, showing how inadequate leadership, counterfeit documentation, and neglect of safety measures had severe public health consequences. At PCA, production was prioritised over food safety, creating conditions for a widespread *Salmonella* outbreak. In contrast, the *Listeria* outbreak at Maple Leaf Foods in Canada prompted a cultural shift, with leadership taking public responsibility and initiating reforms that rooted FSC deeper into operations. The case of John Tudor & Sons in the United Kingdom, linked to an *Escherichia coli* outbreak, reflected poor hygiene practices and non-compliance, revealing weaknesses in FSC at the operational level. These examples support Johnson *et al.* (2022), who highlight that weak FSC increases food safety related risks by undermining communication and accountability. Wu and Wallace (2025) add to this by investigating more recent food safety outbreaks, including a 2022 *Listeria* case in the United States, where the lack of a clear food safety strategy and poor standard operating procedures exposed deeper cultural shortcomings. Table 1.2 provides an overview of foundational reported foodborne illness outbreaks in which FSC has been identified as a contributing factor.

Table 1.2. Summary of Foodborne Illness Outbreaks Linked to Food Safety Culture Deficiencies

Year	Outbreak Case	Pathogen	Organisation	FSC Deficiencies Identified	Source
2005	Cooked meat in school meals	<i>E. coli</i> O157:H7	John Tudor & Sons, South Wales	Inadequate hygiene, weak HACCP, unreliable records, profit-driven culture	Powell et al. (2011); Wu & Wallace (2025)
2008	Deli meat outbreak	<i>Listeria monocytogenes</i>	Maple Leaf Foods, Canada	Limited oversight prior to outbreak; post-crisis reforms with stronger FSC and leadership accountability	Powell et al. (2011); Johnson et al. (2022)
2009	Peanut butter contamination	<i>Salmonella Typhimurium</i>	Peanut Corporation of America (PCA), United States	Limited leadership accountability, questionable testing practices, weak food safety systems	Powell et al. (2011); Johnson et al. (2022)
2022	Ice cream facility outbreak	<i>Listeria monocytogenes</i>	Undisclosed, United States	No formal food safety plan, inadequate SOPs, and insufficient hazard controls	Wu & Wallace (2025)

Wu and Wallace (2025) found that in 32 cases analysed, FSMS were often in place but not effectively implemented. Shortcomings included incomplete HACCP plans, neglected cleaning

protocols, weak oversight of supply chains, and a reliance on reactive rather than preventive measures. While FSMS provide the procedural framework for safe food practices, they are unlikely to generate their intended outcomes without the support of an FSC that reinforces these systems.

1.1.11 Assessing Food Safety Culture

The broader research landscape points to FSC assessments as vital for understanding and strengthening organisational compliance. Wu and Wallace (2025) emphasise that systems and culture are closely interconnected, highlighting the need for assessments that move beyond compliance audits to capture this connection. Such approaches provide the basis for developing more inclusive tools and meaningful interventions. Jespersen *et al.* (2016) demonstrate this complexity through a continuum ranging from ambiguity to acceptance, showing how food safety values become integrated in organisational behaviours to varying degrees. At the same time, da Cunha *et al.* (2025a) warns against overregulating FSC, noting that if it is reduced to a checklist, its nuanced and interpersonal character may be lost.

In the past few years, FSC assessment has increasingly moved toward triangulated methodologies, bringing together surveys, interviews, focus groups, and observational data to capture the complexity of compliance. This shift reflects growing recognition that no single tool can fully account for the cultural dimensions of food safety. By blending quantitative indicators such as behaviour scores and audit results with the perspectives of frontline employees and organisational leaders, researchers are able to uncover the underlying factors that shape practices, from trust in leadership to perceptions of risk and the quality of communication. Triangulation not only lends credibility to findings but also embraces a pluralistic view that values multiple perspectives within organisations, offering a richer picture of how formal systems and informal norms interact to drive either compliance or resistance (Pfeiffer *et al.*, 2016).

This evolution highlights the challenge of balancing structural oversight with the human-centred drivers of a resilient FSC. As Pai *et al.* (2024) and Lin and Roberts (2020) note, audits often fail to capture deeper cultural determinants such as leadership modelling, ethical norms, and employee motivation. FSC tools therefore place emphasis on leadership commitment alongside employee perceptions and risk awareness in order to provide a more holistic view of cultural maturity.

Nayak and Waterson (2017) further note that systematic assessment of FSC is necessary, given its critical role in preventing organisational failures that traditional audits may overlook. Factors such as employee attitudes, managerial commitment, and interdepartmental communication are not peripheral but integral to food safety performance. In response, several FSC models have been developed, including the De Boeck Conceptual Model (De Boeck *et al.*, 2017) and Jespersen's Food Safety Maturity Framework (Jespersen *et al.*, 2016). These tools evaluate dimensions such as leadership commitment, employee perceptions, communication, consistency, and knowledge alignment, offering structured ways to assess and strengthen FSC (Nyarugwe & Jespersen, 2024). FSC assessments have been shown to strengthen behavioural outcomes, particularly in areas such as hygiene management and hazard prevention, across diverse food production settings. Pai *et al.* (2024) expand on these operational benefits by highlighting the value of integrated assessment models, including GFSI, which support continuous improvement through the use of key performance indicators and behaviour-based audits.

Although research on FSC, assessment frameworks, and their role in strengthening compliance has expanded across sectors such as manufacturing, retail, and foodservice, a notable gap remains in relation to the condiment industry. Existing studies have deepened understanding of behavioural influences, leadership involvement, and system integration, yet little attention has been given to how these processes apply to the unique risk profiles, processing conditions, and cultural practices within condiment production. As a result, the sector's contribution to food-related hazards and its potential for cultural transformation remain limited in recognition.

Addressing this gap is essential to advance a more integrated and comprehensive approach to FSC development across the food supply chain.

1.1.12 Exploring Food Safety Culture in the Condiment Manufacturing Sector

The global wet condiment industry operates within a complex environment shaped by diverse cultural influences, shifting consumer demand, geopolitical trade tensions, labour pressures, and economic fluctuations. In periods of economic strain, organisational leadership may prioritise financial sustainability, often balancing this against food safety priorities. Condiments and spices hold significant value in international trade, contributing to both exporting and importing economies. Typically produced as combinations of spices and flavouring compounds designed to improve food after cooking, condiments carry notable commercial and cultural importance. Even with its recognised value, the industry faces contamination risks at multiple stages of production, from cultivation and processing to storage, transport, and distribution (Reinholds *et al.*, 2015). The safety of condiments is further shaped by factors such as processing techniques, ingredient sourcing and stability, and storage conditions.

Although significant advancement has been made in developing global food safety regulatory frameworks, notable regional differences remain. In underdeveloped countries such as South Africa, systemic challenges including labour shortages and fragmented regulatory monitoring increase vulnerability to food-related risks. Combined with regulatory frameworks and FSMS, the concept of FSC has therefore become a central focus in food safety research. Within the wet condiment industry, FSC plays a critical role in reducing contamination risks, ensuring consistent product quality, and protecting consumer health. The expansion of global food trade has also encouraged greater integration across disciplines such as food hygiene, microbiology, nutrition, process engineering, and environmental health, which together form the foundation of food safety systems and influence both national and international standards for implementation and oversight. While each segment of the food industry faces its own challenges, the condiment sector is no exception, with vulnerabilities that need attention. Addressing these requires

moving beyond conventional FSMS, regulatory frameworks, and private standards toward a more inclusive emphasis on FSC (Ciepiela, 2025).

1.2 RATIONALE

FSC is increasingly recognised as a core component of food safety, complementing regulatory frameworks, private standards, and FSMS. While extensive research confirms the value of a strong FSC, the focus has largely remained on major food sectors, leaving sector-specific perspectives underdeveloped. In particular, the wet condiment industry presents distinctive challenges such as fragmented regulatory oversight, specific food safety hazards, and behaviourally driven risks that have received limited scholarly attention. These overlooked functions are critical, as they highlight the complex interplay between organisational culture, technical systems, and human behaviour in shaping food safety outcomes. In the South African context, food safety is overseen by several departments and governed by various regulatory frameworks, including the Foodstuffs, Cosmetics and Disinfectant Act of 1972. However, enforcement and compliance remain inconsistent across manufacturing environments. This fragmented regulatory landscape, together with resource inconsistencies and differing levels of food safety maturity, highlights the need to cultivate a strong FSC to support long-term compliance and consumer protection. The persistence of foodborne illnesses globally over the past two decades emphasises the need to rethink established practices, not only through technical improvements but also through approaches that integrate cultural and behavioural dimensions. By directing attention to an underexamined sector, this study contributes to both academic discourse and practical strategies for strengthening FSC, with the potential to inform more resilient food safety systems and improved public health outcomes.

1.3 PROBLEM STATEMENT

Despite growing recognition of the importance of FSC, little is known about how it is understood, implemented, or challenged within wet condiment manufacturing. Current research continues to concentrate on broader food sectors, leaving a gap in sector-specific awareness. This shortcoming is concerning given the distinctive challenges of condiment production, including

fragmented oversight, foodborne hazards, and behaviourally driven risks. At the same time, the persistence of foodborne illnesses worldwide indicates that existing approaches to food safety have not been fully addressed, reinforcing the need to investigate how cultural, organisational, and behavioural factors interact in underexamined contexts. Addressing this gap, the present research study draws on secondary data from an approved commercial investigation that examined barriers to FSC in a wet condiment manufacturing organisation. Subsequently, aiming to generate actionable findings and inform the development of frameworks designed to strengthen FSC within this sector, thereby contributing to stronger food safety outcomes across the supply chain. Beyond identifying barriers and leadership influences, there is also value in considering how such insights might be translated into practical organisational improvement. Design thinking, as an approach that emphasises iterative development, stakeholder engagement, and problem reframing, may offer a useful perspective for structuring interventions aimed at strengthening FSC. Introducing this perspective provides an opportunity to move from analysis toward the development of context-sensitive solutions.

1.4 RESEARCH QUESTIONS

This study was guided by the following research questions:

1. What major barriers affect the effective implementation of food safety practices in the global condiment industry?
2. How does top management influence the development and sustainability of food safety culture within organisations?
3. Which quantitative and qualitative findings emerged from analysing secondary data in the context of a single wet condiment manufacturing organisation?
4. How do supervisors and senior management in the wet condiment manufacturing organisation use their leadership to promote, strengthen, and sustain a culture of food safety?
5. How can design thinking be applied effectively to generate an integrated model that strengthens food safety culture within organisations?

1.5 AIM

This research study aims to assess the structural barriers that limit the development of a resilient FSC within the wet condiment manufacturing sector, with a specific focus on an organisation in the Western Cape, South Africa. Drawing on secondary data, the research study assesses how organisational constructs shape cultural processes and compliance behaviours, highlighting both challenges and opportunities for developing a conducive FSC. The aim is to generate perspectives that inform best-practice recommendations and guide the design of practical interventions, strengthening FSC through leadership engagement, operational improvements, and the evolution of culture over time.

1.6 OBJECTIVES

- To undertake a comprehensive evaluation of food safety assurance practices within the wet condiment manufacturing sector, drawing on a single wet condiment organisation as a representative case study.
- To provide a narrative exploration of food safety culture in the condiment industry, identifying parallels with broader organisational contexts and considering practical applications for strengthening food safety culture within this sector.
- To conduct a food safety culture investigation in a wet condiment manufacturing organisation through an integrated approach that brings together secondary data analysis with quantitative and qualitative research methodologies.
- To apply an adapted design thinking methodology to establish an integrated model for strengthening FSC within a wet condiment manufacturing organisation.

1.7 DEFINITIONS

Conducting this research calls for a critical engagement with key definitions and their related applications, ensuring that the study is grounded in conceptual clarity and consistency.

BRCGS

BRC Global Standards (BRCGS) is an international certification scheme that defines standards for food safety, quality, packaging, and distribution. Created by the British Retail Consortium and benchmarked by the GFSI, it is applied in over 22 000 sites across more than 130 countries (BRCGS, 2020).

Culture

Culture is the shared cognitive framework that guides how individuals within a group perceive, think, and behave. It shapes values, informs decisions, and distinguishes groups through common norms and practices (Hofstede, 2001).

Food Safety

Food safety is the prevention of foodborne illness through the control of microbiological, chemical, human, and environmental factors across the entire food chain, from production to consumption (Fung *et al.*, 2018).

Food Safety Culture

Food safety culture (FSC) refers to the shared values, beliefs, and norms that shape how food safety is understood and practiced within an organisation. It emphasises that food safety should extend beyond formal standards and be embedded in the daily decisions and actions of everyone, from leadership to frontline employees (GFSI, 2018).

Foodborne Illness

A foodborne illness is an infectious or toxic disease caused by consuming contaminated food. It may arise from bacteria, viruses, parasites, or harmful substances and can occur at any stage of

the food chain. The World Health Organization (WHO) defines foodborne illness as a major global public health concern, with the greatest burden falling on children under five and populations in low-income regions (WHO, 2024).

FSSC 22000

FSSC 22000 (Food Safety System Certification 22000) is an internationally recognised framework for FSMS, built on ISO 22000 and sector-specific requirements. Benchmarked by the GFSI, it enables organisations across the food supply chain to ensure product safety, legality, and quality (FSSC 22000, 2023).

Food Safety Manager

A food safety manager oversees food safety systems, ensures regulatory compliance, trains employees, and encourages a strong FSC within the organisation (Pai *et al.*, 2024).

Food Safety Management System

A Food Safety Management System (FSMS) is a structured framework of procedures and controls that safeguard food safety through technical measures, employee competence, and organisational practices. While FSMS emphasises systematic processes such as hazard control and sanitation, its effectiveness depends on a strong FSC to shape behaviour and minimise foodborne risks (Johnson *et al.*, 2022).

GFSI

The Global Food Safety Initiative (GFSI) is an industry-led effort to improve global food safety by benchmarking and recognising certification schemes such as BRCGS and FSSC 22000. It also promotes a strong FSC grounded in shared values, beliefs, and behaviours within organisations (GFSI, 2018).

Mixed Methods

Mixed methods research combines quantitative and qualitative approaches within a single study to provide a more comprehensive understanding of a problem. It combines the accuracy of numerical analysis (e.g., surveys, statistical tests) with the depth of contextual viewpoints (e.g., interviews, focus groups, observations) (Cassim, 2021).

National Culture

National culture is “the collective programming of the mind that distinguishes members of one group from another” (Hofstede, 2001: 1). It reflects how shared beliefs, norms, and behaviours within a nation shape individual perceptions, interactions, and decision-making.

Organisational Culture

Organisational culture is a pattern of shared basic assumptions developed as a group to address challenges of external variation and internal integration. When these assumptions prove effective, they are regarded as valid and taught to new members as the appropriate way to perceive, think, and feel in relation to those challenges (Schein, 2004).

Quantitative Research

Quantitative research is a systematic approach that collects and analyses numerical data to identify patterns, tests hypotheses, and measures relationships between variables. It uses structured tools such as surveys, experiments, and statistical models to generate objective, measurable perspectives (Pfeiffer *et al.*, 2016).

Qualitative Research

Qualitative research is a methodological approach that seeks to understand human experiences, behaviours, perspectives, and social contexts through the collection and interpretation of non-numerical data. It examines the “why” and “how” of phenomena, emphasising depth, meaning, and interpretation rather than quantification (Cassim, 2021).

1.8 CHAPTER LAYOUT

As outlined in the institution's postgraduate and research policies, this dissertation adopts a purposive-hybrid structure, combining a traditional chapter format with article-based chapters. Chapters 1 to 3 and Chapter 7 frame the overarching research study, while chapters 4–6 present individual manuscripts that report on specific components of the research.

Chapter 1 introduces the study and provides an overview, while Chapter 2 details the research methodology. Some methodological elements are revisited in chapters 4 to 6, as these article-based chapters address specific aspects of the broader study. Such repetition is contextual rather than linguistic, ensuring clarity and coherence across the dissertation. Chapter 3 presents a narrative exploration on food safety assurance in the condiment industry. Chapters 4 to 6 comprise three article-format manuscripts that include the study's key findings and the proposal of an integrated model to strengthen FSC interventions. Finally, Chapter 7 offers concluding reflections, summarises the findings, and provides recommendations and directions for future research.

CHAPTER 1: Introduction

CHAPTER 2: Methodology

CHAPTER 3: Food Safety Culture in The Condiment Industry: A Narrative Review [*Narrative Review of literature*]

CHAPTER 4: A Secondary Quantitative Data Analysis of The Food Safety Culture at A Prominent South African Condiment Manufacturer [*Article 1 on survey questionnaire findings*]

CHAPTER 5: Exploring Food Safety Culture at a South African Wet Condiment Manufacturer: A Qualitative Data Analysis [*Article 2 on interviews, focus group, and an observational assessment*]

CHAPTER 6: Improving Food Safety Culture in the Condiment Industry: Exploring Contemporary Design Thinking Methodologies [*Article 3 on strategies and intervention to overall findings*]

CHAPTER 7: Conclusion

CONCLUSION

This chapter set out the rationale for the research study, including the problem statement, research aim, and key objectives. It also introduced the overall structure of the thesis, outlining its progression. Chapter 2 will present a detailed account of the research methodology, followed by literature reviews that inform and contextualise the chosen approach.

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CHAPTER 2:

Methodology

2.1 BACKGROUND

A mixed method secondary data analysis methodology was applied, utilising data collected in 2021 by a prominent private South African consulting firm operating in the food safety culture (FSC) space, as part of a comprehensive commissioned FSC intervention. The project was initiated to address the audit requirements for a FSC plan and to identify any factors affecting the effective implementation of the current FSMS. The secondary researcher did not participate in the data collection or perform additional validation, but relied on the psychometric properties established by the instrument's original developers and subsequent validation, which included pilot testing, reliability analysis, and factor validation. The quality of the data source was reviewed, and limitations inherent in the re-analysis of pre-existing data were acknowledged. As described by Tripathy (2023), in related studies, the original data is collected by a contracted, independent service provider to fulfil a specific client need, with the secondary data analysis accessing and interpreting information such as internal organisational records, interview transcripts, surveys, or project reports, with the aim of pursuing wider research and scientific objectives. The objective of the primary investigation was to assess the organisation's FSC. Permission to use the data for further research purposes was granted by both the consultation company and wet condiment manufacturer. Drawing on guidance from Saunders *et al.* (2023), this research study employs secondary analysis of quantitative and qualitative data, enabling a cost-effective yet detailed investigation into the organisational structures influencing FSMS. Detailed assessment was conducted to ensure the relevance, credibility, and ethical use of the data, with written consent obtained from both the consulting organisation and the manufacturing organisation (Appendices G, H, and I).

2.2 RESEARCH PARADIGM

This research study was framed within a multi-paradigm philosophical framework, integrating pragmatism, interpretivism, and critical theory. The pragmatic paradigm provided a useful middle ground for both philosophical and methodological methods (Kaushik & Walsh, 2019). According to Saunders *et al.* (2023), pragmatism emphasises practical solutions, contextual relevance, and methodological flexibility, positioning it for a sequential explanatory mixed

methods design. This pragmatic paradigm enables a relational epistemology, a non-singular reality ontology, a mixed methods methodology and a value-laden axiology (Creswell & Clark, 2011; Denscombe, 2017). Pragmatism incorporates elements of both positivism and interpretivism, enabling the use of quantitative and qualitative methods that offer a comprehensive understanding of the research questions (Creswell & Clark, 2011; Cassim, 2021; Denscombe, 2017). As Saunders *et al.* (2023) highlight, pragmatic researchers focus on "what works" in practice, prioritising methodological choices most aligned with the research problem. As a result, this paradigm articulated a problem-solving orientation and emphasised the generation of actionable knowledge through interactive, real-world collaboration (Johnson & Onwuegbuzie, 2004; Creswell & Clark, 2011; Mertens, 2010). The flexibility of pragmatism also enables the analysis of secondary data, where inconsistency may emerge, and informs the iterative nature of interviews and focus groups (Cheong *et al.*, 2023).

The interpretivist paradigm supports the qualitative analysis of this study, enabling the understanding of social phenomena. As stated by Saunders *et al.* (2023), interpretivism emphasises contextual and subjective meaning-making guided by participants' experiences. This correlates with ethnographic and case study approaches that facilitate the collection of qualitative data over time (Rehman & Alharthi, 2016). Examples of qualitative methods in this paradigm include interviews, observation, and content analysis (Cassim 2021). It often employs an inductive approach, wherein theory emerges from the data, and is well suited to investigate complex and ambiguous social constructs (Cassim, 2021). Therefore, this paradigm was deemed appropriate and was applied to interpret nuanced human experiences and meaning structures (Creswell, 2014; Al-Saadi, 2014; Kivunja & Kuyin, 2017).

Critical theory provides a lens to question underlying power structures, ideologies, and systemic constraints. Grounded in the social sciences and also recognised by Saunders *et al.* (2023), this paradigm is influenced by cultural, ethnic, political, gender, and religious forces functioning interdependently to structure society (Rehman & Alharthi, 2016). Its epistemological position assumes that research is inherently normatively charged and shaped by the researcher's

positionality. Researchers within this tradition aim to understand and challenge social injustices (Bronner, 2017), and while qualitative data is most common, it can also align with quantitative analysis. This paradigm enables the detailed investigation of primary and secondary data to uncover institutional norms and inequalities influencing the participants. The research study applied the critical lens during qualitative coding and interpretation. The analysis examined themes such as leadership visibility, communication hierarchies, language accessibility, and resource allocation in relation to underlying power dynamics and structural constraints within the organisation. The primary researcher maintained reflexive memos throughout the process to document interpretive decisions, acknowledge positionality, and reflect on how assumptions may have shaped theme development.

By combining pragmatism, interpretivism, and critical theory, the research study adopts a coherent and multidimensional philosophical stance that aligns with its complex objectives. This approach facilitates both practical relevance and transformative insight, while maintaining methodological rigor and philosophical depth.

2.3 RESEARCH DESIGN

This research study employs a secondary data analysis design, which involves the structured analysis of data initially collected by another investigator. Secondary analysis not only represents a review of existing information; it is an empirical, methodologically grounded process that mirrors the steps of original research, including research design, data evaluation, and analysis (Johnston, 2014). Secondary data may be employed for two purposes: firstly, to investigate new or additional research questions, and secondly, to verify the findings of previous research. In quantitative research both purposes are valid, whereas in qualitative research, the researcher may also corroborate the previous research but would rather explore new or additional findings (Heaton, 2008). This dual purpose provides analytical flexibility and reinforces the credibility of the findings (Saunders *et al.*, 2023).

For this research study, secondary raw datasets and supplementary documentations were employed to determine the existing FSC maturity and identify the food safety related barriers within the wet condiment manufacturing organisation.

2.3.1 Primary Data Collection

The primary data was collected using a mixed-method design, combining both quantitative and qualitative assessments to investigate the organisation's FSC maturity. According to Saunders *et al.* (2023), mixed methods design enhances research comprehensiveness, supports triangulation, and enables profound insight into complex phenomena. The instruments used were adapted from existing literature and further refined for consultative projects commissioned by a recognised food safety consultancy company in South Africa at the time of the study (Griffith *et al.*, 2017, Yiannas, 2009; Jespersen *et al.*, 2016). To support this process, the Human Resources (HR) Department worked closely with the primary researcher, ensuring that participants were clearly briefed on the purpose of the study and comfortable in their understanding of the FSC assessment, which encouraged openness and meaningful engagement (Saunders *et al.*, 2023).

The quantitative data were drawn from a survey questionnaire distributed to all employees, intended to evaluate the existing FSC maturity level of the organisation (Laxton, 2004, Bloomfield & Fisher, 2019). Survey questionnaires serve as an effective tool for collecting standardised data across large populations and are well-aligned for identifying trends, and generating broad generalisations (Saunders *et al.*, 2023, Pfeiffer *et al.*, 2016). Quantitative research offers the benefit of statistical analysis and can yield conclusions with a specific degree of confidence (Cassim, 2021). However, not all data are suitable for numerical expression. To address this, qualitative data were collected through interviews, focus groups, and an observational assessment. Interviews and focus groups are valuable methods for understanding individual perspectives and cultural attitudes in organisational contexts (Saunders *et al.*, 2023). These methods support the exploration of subjective experiences, uncovering refined insights that complement survey findings (Cassim, 2021).

Qualitative data, though rich and contextually grounded, is inherently subjective and may not be suitable for statistical analysis. Instead, content analysis is often used to identify dominant themes (Cassim, 2021). Additionally, qualitative research is recognised to be time-consuming and resource-intensive, but its depth and interpretive power supports its indispensability for exploring human dimensions of organisational culture (Cassim, 2021). The observational assessment was documented in a structured framework by the primary researcher, and while the secondary researcher did not observe this assessment directly, the derived insights were interpreted as contextual indicators for behavioural and organisational patterns. The importance of observational data for capturing non-verbal behaviours and operational realities, specifically when used to support other data collection methods, is recognised (Saunders *et al.*, 2023).

2.3.2 Secondary Data Analysis

The secondary researcher obtained access to all documentation by the primary researcher, including questionnaires, anonymised materials, a consolidated report, and supplementary documentation. In addition, access was extended to the raw datasets comprising of the survey questionnaire, interviews, and focus groups, enabling comprehensive re-analysis and resolution of key concerns. Observational assessment data were limited to the consolidated report, and therefore, the interpretation depended entirely on the information documented by the primary researcher. As outlined by Saunders *et al.* (2023), secondary data encompasses a variety of types including documented data, survey-based data, and multiple-source data, with all being relevant to this study. The variation among these data types enabled triangulation across both quantitative and qualitative elements of the original investigation.

Similar to other research methods, secondary data presents both advantages and limitations. Benefits include time-saving, cost effectiveness, and the ability to offer valuable contributions to knowledge and practice (Pederson *et al.*, 2020). It also enables studies that support policy development, future interventions, and theoretical advancements. Importantly, using pre-

existing data aligns with the ethical requirement to reduce harm in research (Cheong *et al.*, 2023), a principle aligning with Saunders *et al.*'s (2023) emphasis on ethical practices. Disadvantages include data quality concerns, partial contextual knowledge, and differences with the secondary research questions requiring critical consideration (Cheong *et al.*, 2020). Saunders *et al.* (2023) suggest evaluating secondary data using validity and reliability, each of which was assessed in this research study. To mitigate the risk of misalignment, methodological adaptability was employed (Heaton, 2008), and robust justification was articulated regarding the trustworthiness of the original assessment tools used in data collection.

A mixed methods secondary data analysis was undertaken to provide insights that address the research questions. The interdisciplinary complexity of the topic necessitated a design that could integrate both quantitative rigour and qualitative depth (De Vos *et al.*, 2012; Johnson & Onwuegbuzie, 2004). This study employed a sequential explanatory strategy, wherein quantitative data were examined first to identify emerging patterns, followed by qualitative exploration to interpret and contextualise those findings. This sequencing aligns methodologically with the study's broader philosophical stance, which incorporates pragmatism, interpretivism, and critical theory (Saunders *et al.*, 2023). While these paradigms are elaborated in the research paradigm section, it is worth noting here that the methodological flexibility of pragmatism, the subjective emphasis of interpretivism, and the structural critique embedded in critical theory collectively informed both the design and the analytic approach to the secondary data.

Moreover, the use of secondary data enabled expanding the research focus, providing opportunity for novel insights beyond the scope of the original investigation (Cheong *et al.*, 2020). According to Saunders *et al.* (2023), mixed methods using secondary data may introduce challenges to generalisation, notably considering the contextual richness of qualitative data. To strengthen the analysis, this study undertook a comprehensive exploration across a range of data sources, supporting internal consistency and validation of thematic patterns (Polit & Beck, 2010). By employing this approach, the research design was consistent with the philosophical

approach and recognises the complexities of subjectivity, structured critique, and impact-centred research, without being constrained by the limitations of a perspective or data type (Tashakkori & Newman, 2010).

The research design incorporated a structured secondary analysis of data collection methods: a survey questionnaire, interviews and focus groups, and an observational assessment, complemented by a review of relevant literature (De Vos *et al.*, 2012; Tashakkori & Teddlie, 2010). This design reflects a sequential explanatory mixed methods approach, with the integration of these datasets supporting a comprehensive and contextually grounded understanding of the organisation's FSC and informed responses to the research questions.

2.4 RESEARCH METHODS AND DATA COLLECTION TOOLS

In line with the stated research questions and objectives, this section describes the methods and tools employed in this research study. It reflects the integrated, sequential, and mixed methods approach adopted to explore FSC within a wet condiment manufacturing organisation. The section outlines both the rationale for each method and the corresponding data collection instruments used during the primary investigation, which were subsequently analysed in this secondary research study.

2.4.1 Literature Reviews

Terre Blanche *et al.* (2007) emphasise that no research project exists in isolation but rather contributes to and is informed by the broader body of knowledge. Accordingly, the literature was examined continuously throughout the duration of this research study. The review fulfilled multiple functions: identifying the theoretical framework and research paradigm, positioning the project in its broader context, conceptualising definitions, identifying research gaps and opportunities, refining the research questions, and informing methodological choices (De Vos *et al.*, 2012; Terre Blanche *et al.*, 2007). This iterative and critical process contributed to both the methodological and philosophical coherence of the research study. In accordance with Grant and Booth's (2009) typology, several literature review types were conducted throughout the

research study. An initial narrative review (Chapter 1) informed the design and orientation of the research, after which a detailed methodology chapter (Chapter 2) outlined all procedures undertaken during the research process. This was followed by a comprehensive narrative review that synthesised current developments, regulatory frameworks, and opportunities within the wet condiment industry. Targeted reviews were also conducted to provide contextual and thematic background to the three article-based chapters (chapters 4 to 6) that present the research study's findings.

The literature review drew primarily on Google Scholar and ScienceDirect as search engines. Key journals consulted included Food Control, BMC Public Health, Food Microbiology, Food Policy, Food Research & Technology, Journal of Food Protection, Multidisciplinary Digital Publishing Institute (MDPI), and Wiley. Non-English sources were excluded, and the time frame was limited, where possible, to post-2010 publications. The searches were conducted between 2023 and 2025. The review maintained a central focus on the wet condiments industry within South Africa, while also engaging international research to contextualise best practices and broaden understanding. This dual lens ensured that the research study was both locally grounded and globally informed.

2.4.1.1 Narrative Review

Within this framework, a narrative review was conducted to examine the evolving food safety landscape, particularly regarding regulatory frameworks, industry standards, foodborne illness outbreaks, and FSC. The review integrated both chronological and conceptual analyses, tracing key developments, theoretical perspectives, and practical implications relevant to the sector (Grant & Booth, 2009; Saunders *et al.*, 2023). Given the interpretive nature of narrative reviews, selection bias can be a limitation. To mitigate this, the review incorporated a broad range of academic and industry sources across multiple regions, regulatory environments, and methodological approaches. This inclusivity enhanced the credibility and transferability of insights and extended the understanding of how FSC operates within the wet condiment industry and the wider context of global food safety assurance.

2.4.2 Quantitative Research

2.4.2.1 Survey Questionnaire

The quantitative stage of the research employed a survey questionnaire as the primary data collection tool, offering a flexible, standardised, and confidential means of gathering responses across the organisation. Survey questionnaires are particularly well suited for exploring attitudes, perceptions, and organisational culture because they allow participants to provide honest responses anonymously (Bustamante, 2019; Saunders *et al.*, 2023). The survey questionnaire was designed to capture constructs relating to vision, inspiration, empowerment, performance, and change appetite. These food safety constructs were presented on a five-point Likert scale and tailored to reflect the regional and cultural context of the workforce, minimising potential bias (Prof. Ryk Lues, personal communication, 2025a). In addition to thematic content, demographic questions supported subgroup analysis and improved contextual relevance. A template of the data collection instrument is included in Appendix A.

During the primary investigation, the organisation's HR Department coordinated the distribution and consent processes, ensuring voluntary participation and compliance with the Protection of Personal Information Act (POPIA). To maximise accessibility, the self-administered survey questionnaire was made available in both online and printed formats, with verbal and written explanations provided across different shifts. Designated time slots were allocated over a two-day period to facilitate completion. The survey questionnaire offered notable advantages including cost-efficiency, standardisation, and enhanced representativeness, while also generating reliable and valid data (Laxton, 2004; Cassim, 2021). However, it is acknowledged that potential limitations include low response rates or misinterpretation of questions (Jones *et al.*, 2013; Laxton, 2004). Measures were taken to mitigate these risks, such as ensuring complete departmental representation and providing clarity through direct communication.

2.4.3 Qualitative Research

To complement the quantitative findings and provide deeper contextual understanding of the organisation's FSC, qualitative data were analysed from interviews, focus groups, and an observational assessment originally conducted by the primary investigator (Prof. Ryk Lues, personal communication, 2025a). These approaches enabled the exploration of organisational dynamics, attitudes, and practices that were not fully accessible through the survey questionnaire.

2.4.3.1 Interviews

One-on-one interviews were conducted with purposively selected managers occupying leadership and frontline positions. This method allowed for the collection of nuanced, in-depth perspectives on organisational behaviour and leadership engagement in FSC (Denscombe, 2010; Saunders *et al.*, 2023). Moreover, interviews also provided a confidential setting for the discussion of sensitive or personal topics, encouraging honest reflection on organisational challenges and strengths (King & Horrocks, 2010; Kvale, 2007).

A standardised interview agenda containing twenty open-ended questions aligned with the survey questionnaire instrument was used to ensure consistency while allowing flexibility for probing and clarification (Polit & Beck, 2010). Interviews were primarily held in person, with online participation available when necessary. All sessions were recorded for transcription and analysis. Thirteen participants ($n = 13$) representing leadership and senior management contributed to the interviews, a sample size consistent with Guest *et al.* (2005), who suggest that saturation is often reached at around twelve participants. Advantages of this method included the ability to explore attitudes in detail and gather rich qualitative data that expanded upon survey findings, while a recognised limitation was the time-intensive nature of one-on-one engagement (Bryman, 2016; Kvale, 2007).

2.4.3.2 Focus Groups

Focus group discussions were conducted to elicit collective perspectives and shared experiences concerning FSC across departments such as HR, maintenance, finance, and quality. This method leveraged group interaction to generate intersubjective insights and highlight differing interpretations of organisational practice (Saunders *et al.*, 2023; Petros, 2021).

Twelve sessions were held, each comprising ten participants ($n = 120$). Each focus group size followed recommended parameters for effective qualitative exchange (Morgan, 1997; Harvey & Holmes, 2012). The focus group sessions were facilitated by an experienced moderator and structured around open-ended prompts that encouraged discussion beyond predefined themes. To foster inclusivity, participants could also contribute written feedback anonymously (Prof. Ryk Lues, personal communication, 2025b). Sampling combined purposive and convenience strategies to include individuals with relevant food safety expertise while accommodating operational constraints (Bouncken *et al.*, 2025; Saunders *et al.*, 2023). The approach enhanced analytic depth and representation across functional areas, ensuring a balanced representation of the organisational culture. Focus groups provided a time-efficient means of gathering diverse viewpoints but were limited by potential social desirability bias or hesitancy to disclose personal opinions in group settings (Saunders *et al.*, 2023). Complementary use of individual interviews mitigated these limitations and supported triangulation.

2.4.3.3 Observational Assessment

The observational assessment (facility walkthrough) offered direct insight into practical, real-time behaviours within the manufacturing environment, addressing possible discrepancies between reported and observed practices (Marshall & Rossman, 2019; Cohen *et al.*, 2017). Observation is particularly valuable in food safety research as it captures behavioural patterns of culture that participants may not knowingly express (Saunders *et al.*, 2023). A structured checklist (Appendix C), designed to guide the facilitator's evaluation, was used to document the organisation's FSMS performance, employee competencies, training, and compliance practices (Saunders *et al.*, 2023). The observational stage followed the survey questionnaire, interviews,

and focus groups, enabling the verification of previously identified patterns and emerging themes.

The observational assessment generated 48 total occurrences of identified themes relevant to the research study, which is fewer than the number identified through the interviews and focus groups. This correlation aligns with the findings reported in the literature, indicating that qualitative methods such as interviews and focus groups, generate complementary perspectives when integrated with observational methods (Creswell & Poth, 2018; Merriam and Tisdell, 2016).

2.4.4 Data Integration and Triangulation

The sequential mixed methods design of this research study integrated quantitative and qualitative data to develop a comprehensive understanding of FSC within the wet condiment organisation. The survey questionnaire provided breadth, while interviews, focus groups, and the observational assessment contributed depth and contextual interpretation (Tashakkori & Teddlie, 2010).

Triangulation across data sources enhanced validity, enabling the comparison of perceptions with observed behaviours and organisational documentation. Qualitative insights elaborated on quantitative trends, confirming, extending, or challenging patterns identified through the survey questionnaire. This pragmatic integration aligned with the research study's overarching philosophical orientation and methodological framework. All research activities and the secondary analysis of data were conducted in accordance with institutional ethical standards and the POPIA. Comprehensive ethical protocols, including consent, confidentiality, and data security measures, are discussed in Section 2.10 of this chapter.

Finally, this research study was guided by internationally recognised frameworks for qualitative and quantitative research. The quantitative component, based on a survey questionnaire, was reported with reference to the Strengthening the Reporting of Observational Studies in

Epidemiology (STROBE) checklist, as recommended by the Enhancing the Quality and Transparency of Health Research (EQUATOR) Network (von Elm *et al.*, 2007), while the qualitative components were informed by the COREQ (Consolidated Criteria for Reporting Qualitative Research) checklist (Tong *et al.*, 2007). These frameworks provided structure for presenting the research process clearly and comprehensively, in alignment with current best practices in FSC research.

2.5 DATA COLLECTION SETTING

Data were collected within the organisational setting of a South African wet condiment manufacturing facility, providing a practical, real-world context for observing business operations and employee behaviour. This organisational environment ensures ecological validity, as Saunders *et al.* (2023) underscores the importance of conducting research in authentic settings where participants function naturally and data collection aligns with routine workflows.

The majority of employees working within the facility were members of the local community, supporting the relevance and contextual grounding of the study. Demographic data from the 2011 Census conducted by Statistics South Africa indicate that the region is the fourth most populated within the district, comprising a total population of 97 724 (Statistics South Africa, 2011). The population is primarily Coloured (70%), followed by Black African (16%), and White (12%) individuals. Afrikaans is the dominant language spoken by 81% of residents, with isiXhosa and English spoken by 10% and 3%, respectively. Educational attainment levels show that approximately 34% have completed secondary education, 32% have completed primary education, 16% hold a Grade 12 qualification, and 8% have only primary schooling. Notably, the region experiences challenges with educational retention, reporting a learner retention rate of 60.3%, which offers important insight into workforce development and organisational training capacity.

These socio-demographic and educational factors form an essential backdrop for interpreting participant responses and behavioural observations. Saunders *et al.* (2023) advise that research settings be contextualised to account for influences such as regional culture, language, and access to education, all of which shape how organisational values and practices are experienced and articulated by employees. The data collection was conducted with formal approval from the organisation and relevant stakeholders. The organisational setting supported a stratified and purposively selected sample, enabling data collection across departments including production, quality, new product development (NPD), HR, maintenance, and finance; each contributing distinct viewpoints within the broader organisational culture.

2.6 SELECTION OF PARTICIPANTS

2.6.1 Overview of the Sampling Strategy

Sampling methods were aligned with the mixed methods design, using probability-based approaches for quantitative data collection and non-probability methods for the qualitative components (Cassim, 2021). According to Saunders *et al.* (2023), combining sampling techniques supports research flexibility, internal validity, and contextual responsiveness. In this research study, stratified sampling ensured that employee departments were proportionally represented, while convenience sampling enabled timely access to employees available during operational hours.

The selection of participants was designed to align with the study's mixed methods design, which aimed to obtain data from multiple organisational levels and departmental functions. Participants for the survey questionnaire, interviews, and focus groups were recruited from the same target population, enabling consistency and triangulation across data sources. No formal exclusion criteria were used in the survey questionnaire, enabling 100% employee participation. This included employees in both direct production roles (e.g., supervisors, quality staff, food safety teams) and indirect administrative positions (e.g., HR, finance, and maintenance), supporting comprehensive representation.

The secondary researcher was not present on-site during data collection. Both probability and non-probability sampling methods were implemented by the primary researcher, with stratification based on departmental and role responsibilities (Cheong *et al.*, 2023). Although 100% employee participation was encouraged, a calculated sample size of at least 50% per stratum was applied to ensure the appropriateness and applicability of the findings (Prof. Ryk Lues, personal communication, 2025a).

2.6.1.1 Quantitative Sampling

For the quantitative component, the survey questionnaire was distributed to the entire employee population, aiming for 100% participation. No exclusion criteria were applied. While stratification was used to categorise employees by department and role responsibilities, this functioned primarily as a framework for organising and analysing responses rather than for selecting participants.

Stratified sampling was applied to the analysis strata to create subgroups based on department, position, and other relevant organisational criteria. Within each stratum, simple random sampling minimised bias and ensured equitable selection. A list of employees was compiled by the HR Department, and each participant was assigned a unique identifier to maintain confidentiality. Saunders *et al.* (2023) note that stratified random sampling is particularly effective in organisational settings where subgroup characteristics may influence attitudes and behaviours, enhancing precision and representativeness.

2.6.1.2 Qualitative Sampling

In the qualitative analysis, purposeful inclusion strategies enabled thematic relevance and departmental diversity. As Creswell and Plano Clark (2018) note, qualitative sampling frames are often built around participant expertise, functional roles, and relevance to the research questions. With support from the organisation's HR Department, interviewees were strategically selected to include all members of the food safety team, drawing on their specialised knowledge and leadership experience, while focus group participants were identified

to reflect demographic and operational diversity (Prof. Ryk Lues, personal communication, 2025b).

Purposive sampling supports richness and variety in insights by representing both harmonised and contradictory experiences across hierarchical levels, which is particularly valuable when navigating layered organisational dynamics (Bouncken *et al.*, 2025). Purposive sampling was employed for both the interviews and focus groups to include key individuals whose expertise or roles were relevant to the study's objectives. This method was instrumental in selecting interview participants with organisational knowledge. Although this approach may introduce the possibility of subjectivity, it was essential for accessing rich, experience-driven perspectives (Denscombe, 2010). According to Saunders *et al.* (2023), purposive sampling contributes meaningful insight when inclusion criteria is defined, and saturation thresholds are observed. Moreover, Guetterman *et al.* (2015) state that well-aligned sampling across departments is necessary to support integration and meta-inference generation in mixed methods research, particularly where participant diversity strengthens interpretive strengths. A combination of purposive and convenience sampling was used for the focus group discussions. Participants were recruited based on both relevance to the research objectives and availability during scheduled timeframes. While this approach can affect neutrality, it allowed for efficient data collection in a dynamic organisational environment (Cassim, 2021).

For the observational assessment, both convenience and purposive sampling were used, with the objective of evaluating themes identified during the interviews and focus groups (Denscombe, 2010). Observational methodology is grounded on the analysis of data, and therefore any comments related to body language were not included. The aim of the observational assessment was to offer a real-world perspective on the operations, practices, and the organisational context in relation to FSC (Powell *et al.*, 2013; Zanin *et al.*, 2021). The observational assessment or facility walkthrough was guided by a checklist, however additional observations beyond the scope of the checklist were captured. The HR Department ensured that all participants were informed about the facilitators' identity and the objectives of the

walkthrough. The recorded observations were transcribed, while maintaining anonymity. As part of the secondary data analysis, the data for this research study were based on the available data and descriptions contained within the consolidated report, related to the facility, references to food safety documentation, and notes from informal discussions with staff. This integrated approach to sampling enhanced internal validity and supported triangulation across quantitative and qualitative data sources.

2.7 VALIDITY AND RELIABILITY OF THE DATA COLLECTION TOOLS

Ensuring the validity and reliability of data collection tools is critical for maintaining the credibility and integrity of the research process. These concepts support the trustworthiness of empirical data and directly influence the robustness of the findings. Validity reflects the degree to which a research instrument accurately captures the intended construct, while reliability reflects the consistency and stability of measurement across time, respondents, and settings. In the context of this study, which draws upon a mixed methods secondary dataset, these principles were applied at both the instrument development stage and during the critical evaluation of data for reuse. This section presents the strategies employed to uphold these standards across the quantitative and qualitative tools used in the original study.

2.7.1 Validity

Validity represents the extent to which a tool measures what it is supposed to measure. In other words, a tool is valid if it accurately captures the concept or construct it is intended to measure. To ensure content validity, a number of academic and industry specialists contributed to the construct formulation and review, primarily reflecting on work done by industry and academe (Yiannas, 2009, Griffith *et al*, 2010; Jespersen *et al.*, 2016; Nyarugwe *et al.*, 2016). This was implemented with careful consideration to avoid potential infringement of proprietary methodologies that may lead to copyright breaches (Prof. Ryk Lues, personal communication, 2025b).

The emergence of FSC as a certification standard informed the development of themes and constructs and was informed by contributions from global role-players and thought-leaders (GFSI, 2018; FSSC 22000, 2023). Additionally, reflective feedback sessions were conducted to refine the survey instrument. These sessions engaged interest groups such as Michigan State University, Department of Food Toxicology and the Central University of Technology, Free State's Centre for Food Sustainability and Biotechnology (Prof. Ryk Lues, personal communication, 2025c). Academic-industry integrated methodologies facilitated comparative feedback across regions and sectors within the farm-to-fork continuum. These insights supported the ongoing amendment of constructs and approaches for enhanced clarity and relevance. Language use was simplified and refined throughout to ensure optimal understanding among respondents, especially in consideration of South Africa's multicultural composition and diverse societal frameworks (Prof. Ryk Lues, personal communication, 2025c).

2.7.2 Reliability

Reliability captures the consistency, stability, and reproducibility of measurement over time, across settings, and among researchers. A tool is regarded as reliable when it consistently yields similar results under comparable conditions (Saunders *et al.*, 2023).

Given the mixed methods nature of this study, both the quantitative and qualitative instruments were assessed for precision and procedural dependability. For the survey questionnaire, internal consistency was assessed through repeated administration across distinct groups and sectors within the food industry. Repetitive feedback sessions further enabled test-retest reliability evaluation (Polit & Beck, 2010). These feedback loops, developed with academic and industry collaborators, also supported iterative refinement of the instrument. For interviews and focus groups, reliability was supported through procedural consistency, with standardised agendas guiding each session. All engagements were facilitated by an experienced moderator, and open-ended questions framed around thematic themes encouraged structured adaptable discourse. While qualitative reliability does not infer statistical uniformity, Saunders *et al.* (2023) note that methodological consistency safeguards credibility across responses. An observational checklist

was applied across multiple settings, focusing on predefined evaluation areas, such as food safety performance, training, and audit compliance. These measures helped reduce observer bias and enhance replicability (Saunders *et al.*, 2023, Pfeiffer *et al.*, 2016).

Saunders *et al.* (2023) are of the view that secondary researchers have a responsibility to determine the suitability and trustworthiness of pre-existing data collection procedures. In the context of this research study, the original study's systematic development processes and consistent application of sampling and reporting protocols supported reliable reinterpretation. Collectively, the validity and reliability strategies employed throughout this research study support a coherent methodological framework and contribute to the trustworthiness of the research findings within the organisational context selected.

2.7.3 Consistency Considerations

In this research study, the application of Cronbach's alpha as a measure of internal consistency presented several challenges. Specifically, ongoing efforts to improve validity and reliability occasionally yielded scores lower than the conventional threshold of 0.7. This was likely attributable to the multidimensionality of constructs and non-normality of data, specifically in smaller strata. Additionally, Cronbach's alpha varied across translated datasets, including those translated into Afrikaans and isiXhosa, which may have affected linguistic variations affecting question correlation (Polit & Beck, 2010). Considerations of test-retest reliability further challenged interpretation, especially within the framework of FSSC 22000 (v6) requirements related to continuous improvement.

From a semantic and nomenclature design perspective, some overlap emerged between constructs such as vision and inspiration, both of which share elements related to leadership. Similarly, communication appeared across several constructs, though not always explicitly labelled. For instance, the terminology "We are made aware of..." implies communicative intent, as awareness can be interpreted as an outcome of communication effectiveness. These intersections, while methodologically complex, were deemed relevant given the organisation's

inherent multidimensionality. Therefore, beyond statistical criteria, it was important to ensure that the factor structure was theoretically meaningful and contextually grounded in applied and outcome-based research (Mishra *et al.*, 2019). A further consideration in shaping the assessment instrument and sampling strategy was the intent to identify practical gaps and align these with targeted interventions. Such interventions are guided by standards, priorities, and risk exposure, and are typically question/theme-specific, rather than linked to static constructs. Therefore, construct categorisation was informed more by linguistic groupings than by the need to formulate a unified concept to be addressed holistically (FSSC 22000, 2023).

2.8 TRUSTWORTHINESS

Establishing the trustworthiness of a research study is critical for ensuring the accuracy, credibility, and integrity of the findings. Rossouw (2003) and De Vos *et al.* (2012) are of the view that trustworthiness reflects the true value of the knowledge produced during the research process, while Creswell and Creswell (2018) emphasise its role in reinforcing both the strengths of the findings and the credibility of the evidence. In this research study, trustworthiness was supported through the application of established validity and reliability protocols, as well as through systematic strategies aligned with the trustworthiness framework (Saunders *et al.*, 2023).

Moreover, Saunders *et al.* (2023) underscore that trustworthiness in qualitative research can be assessed through four interrelated components: credibility, dependability, confirmability, and transferability, that were originally proposed by Lincoln and Guba (1985). These components ensure that both the methodology and the resulting interpretations remain systematic, evidence-based, and context-sensitive, especially when working with qualitative secondary data. Additionally, Cheong *et al.* (2023) underscore that trustworthiness in secondary qualitative analysis requires careful attention to ethical protocols, methodological transparency, and structured decision-making processes.

2.8.1 Credibility

Credibility refers to the degree of confidence in the validity and trustworthiness of the data collected and analysed (Guba, 1981; Rossouw, 2003). In this research study, credibility was supported by incorporating probing questions within interviews and focus groups, enabling deeper reflection and clarification of meaning. Consistent with Saunders *et al.*'s (2023) emphasis on validation strategies, the study employed peer debriefing and respondent validation to verify the accuracy of qualitative interpretations (Noble & Smith, 2015). In addition, Cheong *et al.* (2023) highlight that credibility in secondary data analysis is reinforced by applying rigorous screening based on context relevance, ethical transparency, and clarity of the primary datasets.

2.8.2 Dependability

Dependability indicates the stability and consistency of the research process over time. To ensure dependability, the research study documented a methodological audit trail that documented decision-making protocols and outcomes across all stages (Polit & Beck, 2010). Cheong *et al.* (2023) recommend incorporating procedural screening criteria as a method of ensuring consistency and traceability in secondary data research. Such transparency supports replication and reinforces process integrity (Saunders *et al.*, 2023). Triangulation across multiple qualitative methods further enhanced consistency, while an investigative audit was implemented to assess the robustness of the research design (Rossouw, 2003).

2.8.3 Confirmability

Confirmability ensures that the findings are grounded in the perspectives and experiences of participants, rather than influenced by researcher bias. In this research study, confirmability was supported by maintaining a transparent and anonymised audit trail throughout data collection and analysis (Noble & Smith, 2015). This aligns with Saunders *et al.*'s (2023) recommendation to safeguard researcher neutrality through documentation and triangulation. The integration of various data sources further enabled cross-verification and reduced the potential for subjective distortion.

2.8.4 Transferability

Transferability reflects the extent to which study findings can be applied in similar contexts or settings. Detailed documentation of the organisational food environment and participant selection process enables other researchers to access contextual similarity and relevance (Onwuegbuzie & Collins, 2007; Polit & Beck, 2010). Diverse sampling techniques captured a range of perspectives across departments, strengthening the potential for broader applicability. According to Saunders *et al.* (2023), such depth and specificity in context description is essential for enabling informed judgements about transferability in qualitative investigation. Cheong *et al.* (2023) reinforce this by advocating for transparent reporting structures that preserve data provenance, source specificity, and ethical limits, in turn enhancing comparability across secondary research contexts.

2.8.5 Establishing Trustworthiness in Food Safety Culture Assessment

Trustworthiness within FSC research extends beyond procedural rigour; it also encompasses the integrity and transparency of the tools used to generate insights. As highlighted by Nyarugwe and Jespersen (2024), the absence of an integrated methodology to assess reliability and validity in FSC tools introduces barriers to demonstrating trustworthiness of resulting findings. Importantly, trustworthiness is not only defined by statistical criteria, it can be supported through attributes such as qualitative rigor and reflexivity (Nyarugwe & Jespersen, 2024). This interpretive depth is particularly relevant within FSC assessments where the complexity of multilingual and multicultural contexts, such as those found in South Africa, reveals the underlying complexities to assessment practices.

In alignment with demands for transparency in validation practices (Jespersen *et al.*, 2023), trustworthiness in this research study was supported by aligning assessment frameworks with recognised standards, enabling comparative interpretation across sectors and linguistic groups (Saunders *et al.*, 2023). The purposeful enhancement of instruments through stakeholder engagement supported the reliability of constructs, while transparent reporting strengthened the credibility of the outcomes.

2.9 CODING AND STATISTICAL ANALYSIS

The analysis was performed using the guidelines reported by Onwuegbuzie and Collins (2011). The mixed methods analysis served a dual purpose of complementarity and expansion, with the quantitative data providing context for the qualitative findings, and the qualitative data offering elaborative depth. The research study employed descriptive statistics with inferential statistics considered under future research prospects only, in cases where inter-construct relationships may be pursued during future follow-up explorations. A parallel analysis was implemented, in which the quantitative and qualitative datasets were analysed separately before being integrated during interpretation.

2.9.1 Quantitative Analysis

The data from the survey questionnaire was captured electronically in a grid format in Microsoft Excel and evaluated to obtain frequencies and percentages (De Vos *et al.*, 2012). These results were subsequently organised in tables and graphs, as presented in later chapters. Descriptive statistics were applied to provide an overview of the dataset. Frequencies and percentages were calculated, alongside measures of central tendency (means) and dispersion (standard deviations), to summarise responses (Mishra *et al.*, 2019; Saunders *et al.*, 2023). Spiral plots were used to visualise collective feedback and illustrate how viewpoints aligned across different constructs of the organisation's FSC, while a box plot highlighted distributional spread by displaying the interquartile range (IQR) and median. No statistical outliers were identified, supporting the use of the mean as an appropriate measure of central tendency. A comparison of the mean and median was also used to inform the interpretation of skewness. Where the median exceeded the mean, the distribution was interpreted as potentially negatively skewed, while a lower median relative to the mean suggested possible positive skewness (Ho & Yu, 2015).

2.9.2 Qualitative Analysis

The qualitative datasets, comprising interviews and focus groups in the form of recordings and field notes, were transcribed electronically in Microsoft Word. A moderator reviewed the

transcriptions against field notes and recordings to ensure validity (Braun & Clarke, 2006; Morgan, 1997). The anonymised dataset was then examined by the secondary researcher using a thematic analysis approach (Saunders *et al.*, 2023; Cassim, 2021). Coding and categorisation were carried out to support the systematic organisation of written segments while maintaining contextual integrity, after which the emerging themes were transferred to Microsoft Excel to facilitate the identification of recurring patterns and cross-cutting insights (Maguire & Delahunt, 2017).

A thematic content analysis approach was adopted as it offers both flexibility and depth, enabling the identification of patterns and meaning across the dataset while remaining sensitive to context (Braun & Clarke, 2006). Each dataset was first examined in isolation, and findings were later compared across methods to enhance rigour. This process enabled behavioural patterns and cultural themes to be synthesised into structured categories for systematic comparison (Cassim, 2021). Within the dataset, the observational assessment or facility walkthrough was analysed through a consolidated report prepared by the primary researcher. The observational report was analysed by coding and interpreting the content within the same thematic framework applied to the interviews and focus groups, allowing themes to be identified that were consistent with, and complementary to, those emerging from the other qualitative methods.

To strengthen data interpretation, descriptive techniques and visual tools such as bubble charts were incorporated into the analysis, which helped to illustrate the relative weight of themes across the three datasets and provided a visual way of reflecting on areas of convergence and divergence (Zhong *et al.*, 2015). Finally, the analysis was grounded in the broader conceptual framework established through the literature review, with perspectives from both academic and industry sources on FSC in the food manufacturing sector (Griffith *et al.*, 2010; Jespersen *et al.*, 2016; Nyarugwe *et al.*, 2016; Yiannas, 2009). Through this integration, the qualitative analysis contributed depth, context, and interpretive insight to the study's overall assessment of the organisation's FSC.

2.9.3 Triangulation

The data from the quantitative and qualitative methodologies provided a detailed understanding of how participants viewed the organisation's food safety, leadership, resources, and the broader barriers that shaped its FSC. Data from the isolated, parallel analyses was gradually transformed and integrated into a consolidated set of findings.

Literature on condiment manufacturing and FSC was collected through targeted searches, which helped establish what has already been documented for this sector, identify the frameworks currently in use, examine the existing challenges, and the potential factors influencing FSC. Triangulation was essential for enhancing the validity and depth of the research study, offering a structured means of comparing areas of convergence, divergence, and complementarity across the datasets (Zhong *et al.*, 2015). Convergence was evident where survey questionnaire outliers aligned strongly with themes expressed in interviews, focus groups, and observations, thereby reinforcing the findings. Also, divergence emerged when a theme was dominant in one dataset but less in another, encouraging reflection on context rather than exclusion, while complementarity was noted where survey questionnaire data highlighted challenges that qualitative methods were able to explain in greater depth, ensuring that the underlying dynamics were uncovered, illustrating how they were experienced in practise (Noble & Smith, 2015; Zhong *et al.*, 2015).

Bringing these insights together, the results of the mixed methods analysis and literature reviews were synthesised into three proposed prototypes for the wet condiment manufacturing organisation. Through an integrated design thinking approach, these strategies included bilingual training, FSC artefacts, and an adapted internal audit framework. The aim was not only to strengthen food safety awareness but also to support the organisation in advancing its FSC maturity, while leaving scope for future research to extend these approaches to other areas of food manufacturing.

2.10 ETHICAL CONSIDERATIONS

Ensuring ethical integrity is a critical component of any research study. It safeguards participants' rights, protects sensitive data, and reinforces the credibility of the research process (Saunders et al., 2023). This study adhered to established ethical principles relating to informed consent, data privacy, participant confidentiality, and the ethical reuse of secondary data.

Throughout both the original data-collection process and the subsequent secondary analysis, all ethical protocols were strictly observed. Participants were informed of the study's objectives, assured of confidentiality, and participated voluntarily in accordance with the Protection of Personal Information Act (POPIA) and institutional ethical standards (De Vos *et al.*, 2012; Saunders *et al.*, 2023). The HR Department facilitated communication, scheduling, and consent procedures to ensure equitable participation and transparency. During secondary analysis, all datasets were anonymised; personal identifiers were removed, and data were handled securely to protect privacy. The study's design prioritised ethical integrity, participant comfort, and respect for organisational confidentiality, and these safeguards collectively strengthened the credibility and trustworthiness of the findings.

2.10.1 Ethical Clearance

Ethical clearance for this research study was granted by the University of the Free State's General/Human Research Ethics Committee (GHSREC) prior to the commencement of secondary data analysis (Ethical clearance number: UFS-HSD2024/1169) (Appendix G). The approval confirmed that the research complied with institutional standards governing research involving human participants, particularly regarding the secondary use of previously collected data. Permission to access and use the datasets for academic research purposes was also formally secured from both the external data collection entity/consulting organisation and the wet condiment manufacturer, in accordance with applicable data governance protocols.

2.10.2 Informed Consent

Assurance of anonymity, informed consent, voluntary participation, and compliance with the Protection of Personal Information Act (POPIA) were communicated by the organisation's HR Department. Before engaging with respondents, verbal acknowledgement of agreement with these assurances was requested. Participation was entirely voluntary, and individuals retained the right to withdraw or decline to answer specific questions, in accordance with recognised ethical best practices.

2.10.3 Financial Implications

The use of the secondary data incurred no financial costs.

2.10.4 Withdrawal Criteria

Not applicable.

2.10.5 Participant Information and Informed Consent

Authorisation in the form of consent letters (Appendix H, I) were provided for the use of the secondary data for this research study. These letters were supplied by the wet condiment manufacturer and consulting organisation responsible for the initial assessment.

2.10.6 Confidentiality

The consent letters outlined the confidentiality requirements. All interactions during the primary data collection stage were communicated as voluntary and anonymous, thereby ensuring compliance with the Protection of Personal Information Act (POPIA). The HR Department facilitated the consent process. All identifying information within field notes and transcriptions that could compromise anonymity was excluded. The survey questionnaire was designed to guarantee anonymity by omitting any identifying details (De Vos *et al.*, 2012). All recordings and data were stored securely in a password-protected system during primary data collection and will remain protected throughout this secondary research study. These measures,

supported by formal consent documentation, confirm that the secondary data analysis aligns with the highest standards of confidentiality and complies fully with POPIA.

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CHAPTER 3:

Food Safety Culture in The Condiment Industry: A Narrative Review

A comprehensive review article for submission partially or in full to Food Science and Food Safety (Wiley; ISSN 1541-4337).

3.1 INTRODUCTION

Food is an essential component of global economics, cultural practices, and social interactions. While it is essential for sustaining human life and well-being, it also presents risks when safety measures are not effectively enforced, resulting in foodborne illnesses and mortality (Seward, 2003). Food safety is widely regarded as essential, and as often stated, if it is not safe, then it is not food. The industry faces challenges regarding sustainability, climate change and supply chain, all of these which are interconnected. The food industry requires a shared focus regarding food consumption and delivery across the global food supply chain (Webb & Morancie, 2015). There is a collective global need to move towards a singular food safety system with effective food safety oversight. The focus of industry role players remains unchanged with food safety, sanitation, risk prevention strategies, traceability, and behaviour constructs among the fundamentals. Challenges related to employee disengagement and disconnect in the food safety context do not necessitate poor leadership. It is an amalgamation of complex cultural, economic, and historical factors that will take exceptional leadership to get organisations transitioning and operating regardless of those barriers.

Both private and public organisations are facing higher education challenges, and in addition there is a rise in the disconnect between workload and reward systems in the workplace. Food safety leadership is essential to foster a sense of collaboration, engagement and accountability among their teams. The food industry has not reached the frontier on how to make food safer, better, more nutritious and assessable. There are opportunities for innovation in the food industry, and the progression of these concepts require highly motivated teams for successful implementation. Ensuring that families and children have access to safe and nutritious foods and building lifelong good eating habits are critical. Even the economically advanced countries are far away from the expanding field of ensuring that food meet the necessary standards. It is unlikely to be achieved solely through policies and procedures, as such measures have limited effectiveness in altering individual consumption behaviours, and it ultimately depends on how organisations are operating. Due to the globalisation of food manufacturing, consumers have access to a wide range of food products. However, this accessibility can introduce food safety

concerns leading to increased contamination and the spread of pathogens (Liu, 2021; Seward, 2003).

Research efforts have increasingly focused on measuring the global burden of foodborne disease, with a study conducted by the World Health Organization's Global Burden of Foodborne Disease reporting the health and economic consequences associated with the consumption of unsafe food (Wu & Rodricks, 2020). Specific demographic groups, including infants, pregnant women, the elderly, and immunocompromised individuals, are disproportionately affected by foodborne illnesses, underlining the need for rigorous food safety measures. The literature underscore food safety related research findings on numerous food categories, including meat, poultry, seafood, and dairy. Condiments, a commonly used flavour enhancer have not received the same level of scholarly attention. The term condiment originated from *L. condimentum* "spice, seasoning, sauce" from *condire* "to preserve, pickle, season" (variant of *condere* "to put away, store") (Spence, 2018). As suggested by its etymology, condiments require a shelf life, which for many years signified it as either vinegar-, salt-, or sugar-based. In addition, it is essential to be more complex and moister than a seasoning (Spence, 2018). Condiments have been used as flavour enhancers since ancient times, typically added to all food types. However, research has found that due to contamination with pathogenic microorganisms, they have shown to be a potential source of foodborne illness outbreaks (Mai *et al.*, 2017).

The WHO has emphasised the need for systemic transformations within global food systems to ensure the availability of safe, nutritious, and sustainable food for all populations. Estimates indicate that annually foodborne diseases impact approximately 600 million individuals worldwide, resulting in 420 000 fatalities, with children under the age of five accounting for 30% of these deaths (WHO, 2015). In addition, the global burden of foodborne illness is further highlighted by the estimated annual loss of 33 million disability-adjusted life years (DALYs). The impacts of climate change, population growth, and changing dietary patterns are anticipated to place additional strain on food production and distribution systems by 2025, further intensifying existing food safety challenges (Nayak & Waterson, 2019). There is a global need for singular

regulatory oversight, specifically in the developing context to investigate the underexamined food sectors, specifically related to food safety assurance. Findings published by the WHO detailed that Africa accounts for approximately one-third of foodborne illness related cases worldwide (WHO, 2011; WHO, 2015).

Globally there are extensive regulatory frameworks available, governing food safety policies to ensure the protection of public health and economic stability. These regulations encompass all food categories, which includes the Codex Alimentarius, the European Union's food safety policies, and regulations established by the U.S. Food and Drug Administration. In addition to food safety, specific guidelines govern labelling requirements to maintain compliance and for the use of flavours (U.S. Food and Drug Administration, 2024). The developed countries have access to advanced food safety regulations, policies, standards and monitoring systems (Havelaar *et al.*, 2015). However, the developing countries experience challenges associated with fragmented regulatory frameworks and enforcements increasing the risk of contamination, poor hygiene practices and foodborne related illness outbreaks. These limitations impact economic progression and international market trade, negatively affecting public health (Food and Agriculture Organization of the United Nations, 2003). Globally, countries have focused on strategies to improve regulatory frameworks. This has included aligning national food safety policies with international standards to promote fair trade practices and safeguard consumer health (FAO/WHO, 2016).

In the developing context, the food industry is challenged regarding regulatory frameworks and the implementation of FSMS. While internationally recognised certification schemes such as Hazard Analysis Critical Control Points (HACCP), ISO 22000, and FSSC 22000 provide structured methodologies for risk management, the implementation is often constrained due to regulatory inconsistencies (Walker *et al.*, 2003). The emergence of FSC has introduced a new narrative that acknowledges the human dimension of food production, distribution, and service. It also reflects the integration of natural and social disciplines in addressing food safety. The literature defines FSC as the shared attitudes, beliefs, and behaviours that influence food safety practices within

an organisation (Strohbehn *et al.*, 2014; Griffith *et al.*, 2017a; Jespersen & Wallace, 2017). Considering the condiment industry, cultivating a strong FSC is vital, given that the individual behaviours of employees contribute to risk management, and if not monitored may result in foodborne outbreaks (Guevara, 2024).

This review explores the evolving food safety environment within the condiment industry, with a specific focus on regulatory frameworks, industry standards, foodborne illness outbreaks, and FSC. The purpose of the review is to provide contextual positioning for the present study rather than to offer a complete or systematic account of the literature. By synthesising insights, this review provides a comprehensive foundation for understanding current food safety strategies and how they relate to the condiment industry. In addition, this review will contribute to future research studies by providing new insights within the condiment industry that can be expanded towards global food safety assurance.

3.2 METHODOLOGY

The current chapter responds to the first objective of the research study: To assess food safety assurance within the condiment industry. Therefore, this chapter serves to provide the context in which literature was collected from various sources. The methodology of this chapter is a literature review synthesised as a narrative review as described by Grant and Booth (2009). More specifically, this chapter provides a narrative review of the overall food safety assurance and regulatory frameworks, the condiment industry and how it relates in the South African context. The literature reviewed included international, national, and government frameworks, procedures, regulatory policies, industry standards as well as other sources. As a result, a narrative review was synthesised to provide the global strategies in response to food safety assurance. Therefore, the review supported the further contextualisation of the importance of regulatory frameworks, industry standards, guidelines, food safety, and food safety culture (FSC).

Literature Selection and Data Sources

A variety of search engines were used in the literature searches. The search strategy incorporated key terms including wet condiments, condiments, sauces, spices, herbs, food safety, FSC, regulations, standards, South Africa, outbreaks, communication, and leadership. Language search limits were applied, and publications in languages other than English were excluded. The date range of sources was limited, as far as possible, to those published after 2010. The literature search was executed between 2023 and 2025. Peer-reviewed journal articles, international food safety standards, and additional sources investigating FSMS, regulatory frameworks, and FSC were included. The primary objective focused on the South African context; however, international studies were also reviewed to contextualise best practices.

Inclusion criteria included peer-reviewed and authoritative sources addressing FSMS, FSC, and regulatory or standards-based approaches within food manufacturing environments, with particular attention to wet condiments, condiments, sauces, spices, and herbs. Empirical, conceptual, and review studies contributing to sector-specific implementation, validation, or regulatory oversight were considered. Exclusion criteria covered studies focused exclusively on domestic or consumer food handling practices without relevance to manufacturing contexts, literature unrelated to processed food production, publications lacking sufficient methodological or conceptual clarity, and duplicate or superseded publications.

The review provides a comprehensive overview of the evolution of food safety-related research. Journal sources included the Journal of Food Control, which contributed approximately 27% of the total peer-reviewed articles analysed in this study. Additional journals included BMC Public Health, Food Microbiology, Food Policy, Food Research & Technology, MDPI (Multidisciplinary Digital Publishing Institute), Journal of Food Protection, and Wiley. The narrative review had an overarching scope and examined regulatory responses across countries, including South Africa. A wide range of related concepts was explored at varying levels of depth. The literature was

analysed to generate insight into the multiple dimensions influencing food safety assurance, and the findings were integrated into a narrative review framework.

Adhering to the initial search methodology, a limited number of condiment-related literature was retrieved necessitating the need to broaden the search scope. The search was widened to include the general food industry to conceptualise where the greater part of food safety research has been conducted. The findings highlighted that dairy, meat, and poultry have been the most widely studied industries specifically related to food safety, FSMS, and FSC. This narrative review offers an overview of food safety assurance while proposing future research areas. The findings highlighted the need for continuing research focused on the condiment sector with the emphasis on strengthening industry standards, improved risk mitigation strategies, and the integration of FSC.

Addressing Potential Bias

While narrative reviews are subject to the risk of selection bias, this study sought to minimise such limitation by incorporating a diverse range of literature across multiple geographical contexts, regulatory environments, and methodological frameworks. By integrating perspectives from both academic research and industry insights, this review provides a comprehensive analysis that extends beyond theoretical discussions to address practical challenges in food safety assurance in the condiment industry.

3.3 RESULTS AND DISCUSSIONS

3.3.1 Food Safety: General Perspectives

The safety of the food industry is influenced by industry best practices, regulatory frameworks, industry standards, and consumer confidence. Food safety has historically been rooted in microbiology and public health, both in empirical analysis and regulatory frameworks (Spence, 2018). As the global movement of food across borders expanded, including condiments, the disciplines of food hygiene, food science, microbiology, food nutrition, food process engineering, and environmental health have become increasingly connected. Collectively, these

key areas influence food safety assurance, establishing a foundation for national and international standards designed for implementation, management, and compliance (Yiannas, 2009).

By evaluating the effectiveness of existing regulatory approaches, these sections aimed to highlight current oversight in food safety and the challenges introduced by global trade dynamics. They further emphasised the need for strengthened risk mitigation strategies. Additionally, it explores emerging trends in food safety governance, including the role of technological innovation and cross-border regulatory harmonisation in enhancing food safety assurance on a global scale.

Conceptualising Food Safety

According to the WHO (2022), foodborne illness outbreaks remain a global public health concern, with contaminated food reported as the primary source of pathogens distribution. Access to safe and nutritious food is essential for survival, placing responsibility on food manufacturers to adhering to food safety standards. Regulatory compliance is vital for the protection of public health and consumers trust (WHO, 2022). There are several definitions from scholars defining food safety. Seward (2003) noted that the term food safety differs within industry stakeholders, including industry leaders, governments, regulators, researchers, and consumers given that food safety is often subject to context and priorities. The differing viewpoints creates barriers impacting regulatory frameworks, industry standards, and academia (Lamm *et al.*, 2020; Raspor, 2008). Table 3.1 shows an overview of food safety definitions obtained from the literature.

Table 3.1. Descriptions of Food Safety

AUTHORS	DEFINITIONS AND EXPLANATIONS
American Society for Microbiology, 1998	Establishing raw material and finished product specifications that include acceptable limits for chemical hazards, physical hazards, and microbiological hazards. Food safety extends beyond production and revenue to encompass acceptable management and consumption habits from consumers.
Food and Agriculture Organization of the United Nations, 2003	The importance of food safety's direct influence on agriculture, international trade, and public health. Challenges can have a negative impact on consumers and global markets, underscoring the need for international food safety regulations.
Seward, 2003	When managed acceptably during the manufacturing process, introducing minimal risk of foodborne illness.
World Health Organization, 2006	The World Health Organization (WHO) defines food safety as the assurance that food, when properly prepared and consumed as intended, does not pose a risk of harm to the consumer.
Raspor, 2008	Ensuring that food does not pose any harm to the consumer when it is prepared and consumed as intended.
Borchers <i>et al.</i> , 2010	A reasonable assurance that food will not cause harm to the consumer when prepared and consumed according to its intended use.
Baert <i>et al.</i> , 2011	Ensuring food safety at every stage of manufacturing, from production, processing, and distribution, must be upheld to safeguard public health. Considering standard conditions of use and the relevant information available for the specific food products. Food safety is defined as the assurance that microbiological, chemical, or physical hazards are absent or reduced to acceptable levels and do not pose a health risk to consumers.

Manning, 2017	A field focusing on the accurate handling, preparation, and storage of food to prevent foodborne illnesses. Regulated by food legislation, setting minimum requirements for the food industry to follow during manufacturing.
Australian Institute of Food Safety, 2017	Accurate food handling, preparation, and storage to minimise the risk of foodborne illnesses and protect consumer health.
Dora-Liyana <i>et al.</i> , 2018	Includes the conditions and controls required to maintain food that is safe, nutritious, and acceptable during all stages of production and consumption. As a global public health priority, it has a vital role in protecting human health and preventing foodborne illnesses.
FAO/WHO Codex Alimentarius Commission, 1969	Assurances that food, when prepared and consumed as intended, does not pose any health risks.

Upholding food safety across the global supply chain is complex, demanding harmonised oversight across the food distribution network (Hobbs *et al.*, 2002). Condiment manufacturing has become increasingly complex as a result of the globalisation of raw materials, commonly imported from multiple countries following different food safety regulations. This present challenges in developing countries increases the likelihood for food-related risks. Consequently, there is a need for the implementation of robust FSMS at every stage of supply chain (Hobbs *et al.*, 2002). Research suggests that food safety regulations have a significant influence on government policies, trade agreements, and global market dynamics (Rohr *et al.*, 2005). The evolution of food safety governance underscores the need to prioritise proactive risk management strategies, as new risks emerge annually, including ingredient adulteration and environmental contamination (Jadhav & Choudhary, 2024). Industry stakeholders, including governments, regulatory bodies, and industry standards need to align strategies to shape a singular and resilient global food safety framework enabling an impactful adherence with evolving challenges.

Food safety contributes to the global economic domain. According to Fortune Business Insights (2025), the condiment market was valued at USD 85.11 billion in 2022, and the projected growth was USD 135.60 billion by 2023, influenced by fluctuating consumer demands, product innovations, and the growing consumer awareness concerning food safety. In this competitive environment, food safety has emerged as a key differentiator influencing consumer perceptions, brand reputation, and market positioning. Powell *et al.* (2011) state that organisations that integrate scientific improvements, build a strong FSC, and prioritise stakeholder communication are better positioned to build consumer trust. However, ensuring end-to-end accountability across the supply chain, from agricultural producers to the production facilities, distributors, and retailers requires consistent food safety strategies and active collaboration (Powell *et al.*, 2011). As food safety concerns continue to shape industry priorities, organisations that proactively adopt safety measures and align with evolving regulatory frameworks and industry standards are more likely to maintain a competitive advantage. The future of food safety requires surpassing food safety compliance and encompassing the behaviours and core values of the individuals of organisations, investing in technological advancements, and consumer expectations.

3.3.2 The Evolution of Food Safety Standards

Food safety regulatory systems have been shown to be fragmented and in need for a singular regulatory agency. Traditionally, food safety regulation was developed per regulatory domain and has led to legal inconsistencies across regions. Over time there has been a rapid expansion of international trade, currently exceeding USD 520 million per year, underscoring the need for singular food safety protocols to address the complexities linked to global food production and distribution (MacDonald *et al.*, 2015). Moreover, global food safety governance has evolved to incorporate regulatory frameworks and industry standards. Third-party certification schemes and quality assurance programmes have advanced as essential compliance tools across the global food supply chains to improve food safety oversight and standardisation internationally (Henson & Caswell, 1999).

An overview of the evolution of various certification schemes is summarised in Table 3.2, signifying how risk-based and internationally harmonised standards have strengthened regulatory oversight. These advancements demonstrate a global industry movement in response to emerging challenges and threads. Global food supply chains, the increasing use of novel food products, and the adoption of automated food processing technologies necessitate dynamic regulatory frameworks for the addressing of new and evolving risks in global food safety management.

TABLE 3.2. The Evolution of Certification Standards (Weinroth *et al.*, 2018)

CERTIFICATION STANDARD	EVOLUTION	YEAR
HACCP (Hazard Analysis and Critical Control Points)	HACCP principles established (thereafter published as Dutch HACCP - GFSI approved).	1960
Codex Alimentarius Commission	Published general principles of food hygiene.	1969
HACCP (Hazard Analysis and Critical Control Points)	HACCP integrated into EU regulation.	1991
HACCP (Hazard Analysis and Critical Control Points)	HACCP standard published in SA.	1996
ISO 22000 (International Organization for Standardization)	An international standard that stipulates requirements for a food safety management system.	2005
ISO 22000 (International Organization for Standardization)	ISO 22000 incorporated into FSSC 22000 certification scheme.	2009
ISO 22000 (International Organization for Standardization)	ISO 22000:2018 second edition published.	2018

FSSC 22000 (Food Safety System Certification)	A global food safety certification scheme based on ISO 22000 and additional sector-specific requirements. Current edition of FSSC 22000 v6 scheme published.	2023
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Table 3.2 demonstrates the progressive formalisation and international alignment of food safety certification standards over time. While these developments have strengthened risk-based regulatory control, continued revisions indicate that technical systems alone do not ensure consistent food safety outcomes (Wu & Rodricks, 2020). Effective implementation depends on how standards are integrated within organisations, highlighting the importance of leadership, behaviour, and shared accountability.

Food Safety Management Systems

Globally, the implementation of a FSMS is considered the minimum requirement. An FSMS is as a system “designed, validated, implemented and verified to control, and where possible eliminating, any potential food safety hazards associated with a product and methods of production to ensure compliance with food safety legislation, retailer requirements and/or private third-party certification standards” (Manning & Grant, 2025: 1). Prerequisite programmes (based on Codex Alimentarius, Good Manufacturing Practices, and legal requirements), alongside the concept of HACCP, represent the fundamental principles of an FSMS and management system standards (such as ISO 9001), adding managerial and organisational elements to the system (Manning *et al.*, 2019). The literature suggests that a significant number of research has focused on FSMS adoption in multiple regions. A comparative study by Lee *et al.* (2023) examined the level of FSMS implementation in developed and developing regions among 116 small and medium-sized enterprises (SMEs). The study showed that in developing regions, adoption rates increased significantly (16.7% to 63.9%), and in the developing countries it increased from 26.6% to 48.1%. While progress was observed, structural challenges in the baked goods, meat, and processed fruits sectors was observed primarily because of the lack of awareness and fragmented compliance. The study supported the need for additional sector-specific strategies aimed at the implementation of both regulatory

frameworks and FSC (Lee *et al.*, 2023). Moreover, the study emphasised administrative challenges, impacting the prevalence of food safety standards.

A study carried out in Bangladesh assessing food safety performance of cereal-based SMEs identified administration as a key barrier to FSMS implementation (Singha *et al.*, 2025). The findings supported former observations by Luning *et al.* (2011), highlighting that FSMS effectiveness is shaped by technical capabilities and decision-making procedures rooted within organisational governance structures. Similar challenges were identified by Baş *et al.* (2007) identifying challenges linked to employee knowledge, high turnover, and lack of training frameworks, having a negative impact on the FSMS. Collectively, these findings underscore the requirement for targeted interventions aimed at organisational development, workforce sustainability and access to technical support within the SME sector (Singha *et al.*, 2025).

A related study by Mkhwanazi *et al.* (2024) underscored the need for improved regulatory frameworks in addressing ongoing food safety challenges. In lower-income countries, the limited governance is further intensified by insufficient organisation and lack of resources (Gordon *et al.*, 2020). Nonetheless, the Food Safety and Standards Authority in India showed concerns regarding the governance identifying uncertainties in food safety policies and fragmented enforcement creating challenges in the adoption of FSMS (Yang, 2019). A study in Brazil indicated that regulatory improvements does not result in microbiological risk mitigation in food products (van der Meulen *et al.*, 2022; Taniwaki *et al.*, 2019). Moreover, the 2008 melamine incident in China highlighted weaknesses in regulatory frameworks and food safety oversight, demonstrating the impact of governance failures. This incident led to regulatory improvements in the country, including the optimisation of the Food Safety Law, prioritising risk prevention, assessments, and communication (Jia & Jukes, 2013; Jiang *et al.*, 2018). According to Pei *et al.* (2011) and Kirezueva and Luning (2017), the implementation of HACCP as a mandatory requirement has contributed to improved compliance and demonstrated that the integration of regulatory frameworks with systemic enforcement can improve food safety outcomes.

A study conducted by Chaoniruthisai *et al.* (2018) explored the challenges of FSMS implementation in Thailand, citing existing literature associated with the challenges shaping FSMS implementation. Researchers have undertaken FSMS studies in New Zealand, Portugal, Serbia, Spain, The United Kingdom, and Zimbabwe in various sectors, including catering, meat and poultry processing. Research by Grace (2015a) regarding food safety in developing countries, emphasised that outdated regulatory frameworks, redundant regulatory directives, and limited attention to the informal sector exacerbates effective FSMS implementation (FAO, 2005). The literature highlights the awareness and need for food safety improvements globally. Additional investigation regarding regulatory frameworks, risk assessment models, and compliance strategies may contribute towards food safety assurance within this sector.

Science versus Behaviour-Based Food Safety Management Systems

FSMS has evolved significantly over the years, shifting from traditional “command and control” methods, where food safety was ensured through inspections of finished products to proactive, systems-based approaches that emphasise control throughout the entire manufacturing process (Fairman & Yapp, 2005). Within today’s modern methodologies, HACCP and HACCP-like systems are highly prominent, as they focus on managing risks proactively moving beyond only detection of food safety breaches after production. These frameworks require organisations to generate tailored FSMS that address specific operational needs, accounting for factors such as industry sector, product types, the production environment, and external factors (Krzyzaniak, 2018).

Table 3.3 provides the main differences between science-based food safety management and behaviour-based food safety management, demonstrating how these approaches address the complexities of food safety. The selection between these methods, or their integration, is increasingly recognised as a determining factor in shaping an organisation’s FSC. Understanding the inferences of each approach enables organisations to assess how they can be effectively combined to enhance FSC maturity within specific industry contexts.

TABLE 3.3. Comparative Depiction of Scientific-Based and Behaviour-Based Approaches in Food Safety Management Systems (Manning & Grant, 2025; Thorsen *et al.*, 2025; Zanin *et al.*, 2021b; Spagnoli *et al.*, 2025; GFSI, 2018).

FEATURE	SCIENTIFIC-BASED FOOD SAFETY MANAGEMENT	BEHAVIOUR-BASED FOOD SAFETY MANAGEMENT
Primary Focus	Scientific principles, regulations, and standards.	Behaviour, attitudes, and decision-making related to food safety.
Approach to Risks	Assesses and mitigate risks based on scientific analysis, testing, and data.	Recognises the role of human behaviour in identifying and managing risks, aiming to shape behaviour to prevent errors.
Regulatory Compliance	Driven by compliance with industry regulations and standards.	Integrates regulatory compliance. Places a significant focus on influencing employee behaviour to exceed minimum requirements.
Root Cause Analysis	Leverages scientific methods to examine and resolve the fundamental drivers of challenges.	Integrates behavioural study combined with scientific methods for a complete understanding of the barriers, emphasising human factors.
Training and Education	Technical training to ensure employees understand and follow recognised procedures.	Behavioural training influencing employee attitudes, decision-making, and the implementation of safe practices.
Continuous Improvement	Driven by scientific analysis of procedures and outcomes.	Actively including employees in identifying areas for improvement and addressing behavioural aspects affecting food safety.

Responsibility and Accountability	Places responsibility on following recognised procedures and standards.	Encourages a shared responsibility for food safety, highlighting individual and shared accountability for behaviour and decision-making.
Employee Involvement	Follow established protocols and guidelines.	Employee involvement in recognising risks and suggesting improvements. Shaping a positive FSC through behavioural efforts.
Feedback and Reporting Systems	Data-driven feedback systems based on scientific measurements.	Open communication, reporting of near misses, and a feedback loop that includes scientific data and behavioural insights.
Cultural Emphasis	Adherence to standards and procedures.	Changing cultural norms to prioritise a hands-on approach to food safety. Focusing on influencing behaviour for a continuous improvement mindset.
Preventive Measures	Obtained from scientific analysis.	Extends beyond technical aspects, addressing behavioural essentials to prevent errors and improve overall food safety.

The scientific-based and behaviour-based FSMS encompass elements that are important to the condiment industry. The inclusion of regulatory frameworks with human behaviour represents a suitable balance between food science, training, policies, attitudes, and the importance of communications given the complexity of food safety management (GFSI, 2018; Crandall *et al.*, 2017).

3.3.3 Food Safety Culture

Compliance Evolution

Having a strong FSC within an organisation contributes to the overall effectiveness of regulatory frameworks and industry standards. Systemic regulatory oversight and strong food safety policy frameworks adds to improved compliance and accountability within the food industry (De Boeck *et al.*, 2017; Taylor, 2011). Challenges associated with regulatory shortfalls and variable food safety policies are more evident in regions undergoing economic transitions (Kireziova *et al.*, 2015; Nyarugwe *et al.*, 2020). A Brazilian study investigating FSC in food services linked to different risks of foodborne diseases, found that barriers exist in ensuring compliance with food safety regulations related to poor data collection and variable implementation. In addition, the findings emphasise the underreporting of foodborne illnesses which reinforces interventions (de Andrade *et al.*, 2020). The study highlighted regulatory shortcomings, strengthening requirements for more robust food safety oversight. The introduction and recognition of FSC has been significant in the development of food safety governance, taking a critical role in the establishment of food safety standards.

Traditional regulatory frameworks concentrated on food safety compliance, whereas FSC emphasises the importance of human behaviour, cultural dynamics, and the role of leadership impacting food safety outcomes. The research suggest that regulatory compliance alone does not adequately address the prevention of foodborne illness outbreaks and food safety risks. Organisations that have a positive FSC, with food safety rooted as a core value provides greater certainty that food safety practices are followed and prioritised across all levels of the organisation. Theoretical models and assessment frameworks have been developed to strengthen this transformation, such as the BRCGS Food Safety Culture Excellence Module (BRCGS, 2018), focusing on FSC within organisations; the FSSC 22000 which is a food certification scheme based on ISO 22000 and recognised by the GFSI (FSSC 22000, 2023, GFSI, 2018). These models and frameworks include requirements for the implementation and improvement of FSC within an organisation. The availability of models designed by industry experts to integrate FSC into organisational practises are examples of such frameworks that can assist in transforming

FSC (Yiannas, 2009; Griffith *et al.*, 2010b; Powell *et al.*, 2011). These methodological frameworks offer tools for assessing leadership commitment, employees' behaviours, organisational vision, empowerment, inspiration, willingness to change, and food safety policies and procedures. Integrating FSC principles into the organisational culture can support the transition from a compliance-based to a proactive, risk-orientated organisation.

A historical snapshot of the development of the various standards that address FSC found its roots in HACCP and related risk assessment, management and mitigation systems created in the 1960s. The ISO standard was followed by the Codex Alimentarius principles linked to food hygiene (1969). The incorporation of HACCP into the European Union regulations occurred in 1991 and was adopted globally. In 2005, the first issue of the ISO 22000 was published. This was followed by the incorporation thereof into the FSSC 22000 certification scheme; publication of ISO 22000:2018 (2018) and, most recently, the publication of FSSC 22000 v6 (2023) (FSSC 22000, 2023). In terms of the BRC standard, components such as continuous improvement (2010), the introduction of an FSC module in 2018, and formal integration into the BRCGS standard (2020) have guided the development (BRCGS, 2022). The SQF, IFS and PAS 320 systems also recognise FSC components, which are advanced through GFSI benchmarking (GFSI, 2018). These individual standards continue to evolve, focusing on how FSC is implemented and maintained in complex and multi-faceted food manufacturing and processing environments. Collectively, these standards aim for inclusive food safety assurance through developing organisational cultures that promote food safety performance (Da Cunha *et al.*, 2025a; GFSI, 2018; da Cunha *et al.*, 2025b).

Beyond Compliance

Global food safety standards and certification systems have been established with sound rationale, reflecting a concerted effort to prevent foodborne outbreaks, reduce economic losses, and safeguard lives. Therefore, the principle of a conducive FSC “beyond” and not “instead of” systems need to be recognised and reiterated. The dichotomy in formalising FSC principles has been that of a concept endorsed as “doing something because it’s the way we do

things around here, even with no one watching”, has been incorporated into the standards (Olsen *et al.*, 2023). The implementation of compliance-based frameworks and regulatory systems has shown to contribute to the overall improvement of food safety governance; however, foodborne outbreaks continue. There is a growing recognition within food safety management that food safety cannot be separated from product quality, as the two are inherently interconnected.

The concept of “performance beyond compliance” has extended within the food safety domain, mostly in relation to the connection between regulatory frameworks and legal policies. While statutory regulations and industry standards establish minimum safety requirements, they do not fully address the fast-evolving risks in the food supply chain. In addition, regulatory compliance alone does not essentially translate to long-term consumer trust or supply chain resilience. A challenge among industry stakeholders is the concept that compliance with regulatory requirements represents effective risk management. The food industry is continuously evolving, and consequently the continuing collaboration between industry, regulatory bodies, and researchers, as well as adaptability, are essential. Therefore, the integration of technological innovations, data driven risks assessments and traceability tools are important to future developments for the strengthening of global food safety management.

Literature Perspectives

Drawing on several research studies, this section explored how regional contexts shape FSMS implementation and how FSC functions within different sectors of the food industry. Research conducted in Brazilian restaurants showed that organisations with a more reactive FSC were more likely to display weaknesses in hygiene practices during food handling, storage, preparation, and service (de Andrade *et al.*, 2021). Similarly, a study conducted among small restaurant owners in Madagascar revealed high levels of microbiological contamination, poor hygiene practices, and limited food safety knowledge, all of which contributed to a predominantly reactive FSC (Sarter & Sarter, 2012). A study conducted across three Midwestern states in the United States examined how employees’ perceptions of food safety differed by

geographical location. The findings revealed an overall positive outlook toward FSC, although areas for improvement remained; particularly in relation to management involvement (Abidin *et al.*, 2014). A United States-based study conducted across 50 grocery retail deli departments reported a positive FSC, characterised by strong commitment from both management and employees. The findings indicated that the reduced risk of *Listeria monocytogenes* contamination was largely attributed to targeted training initiatives and adequate infrastructure (Wu & Rodricks, 2020). Similarly, a case study by Watson *et al.* (2022) at a high-risk fish processing company in the United Kingdom revealed a misalignment between management and employees in their efforts to create and sustain a positive FSC. In Nigeria, Onyeka *et al.* (2021) found that strengthening management practices and communication strategies tailored to regional contexts and informed by local food safety practices were essential for improving the overall FSC. Moreover, research in Belgium demonstrated a positive relationship between a strong FSC and cost allocation strategies, particularly in relation to prevention and evaluation costs when assessing the financial dimensions of compliance (Spagnoli *et al.*, 2024).

Collectively, these studies underscore the need to consider the diverse stakeholders that shape FSC across different sectors of the food industry. They also point to the importance of ongoing research within the condiment sector, as cultural and operational dynamics remain inadequately explored. The wider body of literature confirms that a strong and supportive FSC not only improves food safety outcomes but also enhances organisational culture and overall performance, framing FSC initiatives as strategic investments rather than simple compliance measures (da Cunha *et al.*, 2025a; GFSI, 2018; da Cunha *et al.*, 2025b; Crandall *et al.*, 2017).

Research on FSC assessment continues to highlight the need for a standardised and generally accepted evaluation tool. Ze *et al.* (2024) demonstrated that methodological inconsistencies can complicate comparisons across food industry sectors, underscoring the importance of reliable and harmonised approaches. A range of assessment tools has been developed and applied by researchers, such as the five-point Likert scale focusing on leadership, communication, and the working environment (de Andrade *et al.*, 2020, de Andrade *et al.*, 2021), as well as the Jespersen

model, which integrates broader organisational culture dimensions (Jhuang & Chen, 2019). In contexts where FSC assessment or intervention outcomes are questioned - particularly in cases of underperformance or non-compliance - it is essential that the process be trustworthy, consistent, and contextually meaningful. An effective FSC assessment should serve not only as a diagnostic instrument but also as a framework for improvement. This involves building awareness around the risks associated with condiment products and fostering a sense of ownership and engagement at all organisational levels.

Assessing and interpreting the prevailing FSC makes it possible to identify critical gaps, align findings with recognised standards, and guide the development of focused improvement strategies. To ensure purposeful progress, interventions should be carefully prioritised, structured, and implemented through a clearly defined rollout plan. Once employees across all departments have a shared understanding of the processes influencing food safety, from the receipt of raw materials to product dispatch, the internal audits become essential to assess consistency with standardised expectations. Revisiting the improvement process helps to maintain compliance over time, while external audits serve as the final step toward achieving formal certification (Thorsen *et al.*, 2025).

Overview of Significant Foodborne Illness Outbreaks related to FSC

There have been numerous foodborne outbreaks globally, leading to widespread illness, hospitalisation, loss of life, and in some cases, the closure of food businesses. These events have played a defining role in shaping regulatory frameworks, food safety standards, and FSC, while also highlighting persistent weaknesses within FSMS. Many reported outbreaks have been linked to fragmented regulatory oversight, limited surveillance capacity, inadequate supply chain controls, and poor food safety awareness. Table 3.4 provides a summary of some of the most extensively documented foodborne illness outbreaks, illustrating how such incidents have informed both policy development and industry practice.

TABLE 3.4 Case Studies of Major Foodborne Outbreaks

COMPANY NAME	DETAILS OF OUTBREAK
John Tudor & Son	An <i>Escherichia coli</i> O157:H7 outbreak in 2005 in South Wales infected children. The source was traced to contaminated meat supplied by a John Tudor & Son (Pennington, 2009). Findings indicated a poor FSC, and that revenue growth was priority.
Maple Leaf Foods, Inc.	A food safety outbreak in 2008 linked to deli meats contaminated with <i>Listeria monocytogenes</i> in Canada (Howell & Miller, 2010). The incident led to 57 cases of illness and 22 lives lost. Findings linked to poor hygiene practices, shortcomings within the FSMS, and overall, an ineffective FSC (Mason, 2009; Powell <i>et al.</i> , 2011).
Peanut Corporation of America (PCA)	An outbreak of <i>Salmonella Typhimurium</i> in 2009 in the U.S. linked to peanut products manufactured at PCA. The outbreak led to 691 illnesses and loss of nine lives. Absence of proper sanitation practices, insufficient working environment, re-testing of products to obtain a negative result, or dispatching of samples prior to the availability of results. In summary, an absence of a FSC (Powell <i>et al.</i> , 2011).
Earthbound Farms	Bagged spinach contaminated with <i>Escherichia coli</i> O157:H7 leading to an outbreak in the U.S. Findings identified poor sanitary conditions as sources of contamination (Powell <i>et al.</i> , 2013).
Caito Foods	Pre-cut melons contaminated with <i>Salmonella</i> in the U.S. leading to 77 illnesses (Centres for Disease Control and Prevention, 2019).

Despite ongoing improvements in FSMS, foodborne outbreaks continue to occur. The literature suggests that the underlying causes of these incidents are often linked to cultural and behavioural factors, highlighting the need to shift from a purely science-based approach to one that also integrates behaviour-based food safety management.

3.3.4 Condiments: Market Dynamics and Industry Challenges

Globally, the condiment industry is influenced by diverse cultural traditions, consumer preferences, trade dynamics, labour demands, and economic fluctuations. It is understandable that, during periods of economic uncertainty, management attention may shift toward ensuring financial sustainability. Examining the sector through a comparative lens provides valuable insight into how these contextual factors shape production and food safety priorities.

The condiment sector, characterised by strong regional demand and export potential, continues to grow in response to consumer preferences for convenience (Mordor Intelligence, 2024). In China, one of the world's largest condiment markets, deeply rooted culinary traditions intersect with evolving economic trends to shape consumption patterns. In Japan, recent market analyses indicate increasing consumer demand for organic and natural products, accompanied by heightened concern over chemical additives and food safety risks. Similarly, in India, condiments such as spices, herbs, seasonings, and sauces form an integral part of everyday cuisine and represent a significant component of the national food sector (Mordor Intelligence, 2024).

Refocusing on the South African context, the condiment industry reflects the country's multicultural heritage, influenced by African, European, and Asian culinary practices. Within this market, performance is shaped by governance structures, economic stability, and shifting consumer purchasing behaviours, all of which directly influence production priorities and food safety management within the sector.

The global condiment sector was projected to reach a value of USD 262.34 billion by 2024, with China serving as the primary source of revenue (Statista, 2025a). Although smaller in scale, the South African condiment market has shown notable expansion, with a projected compound annual growth rate (CAGR) of 4.68% and an estimated market value of approximately USD 535.7 million (Statista, 2025b). This rate of growth surpasses that of the United States, which recorded a CAGR of 2.36% (Statista, 2025c), even though South Africa's per capita revenue (USD 8.37) and

consumption (1.8 kg) remain below global averages. Across the continent, the condiment sector in Africa is expected to expand at a CAGR of 10.11% between 2024 and 2029 (Statista, 2025d). These projections highlight the growing relevance of condiment-focused research, particularly studies centred on food safety assurance. Expansion within this sector has significant consequences for food security, public health, and economic competitiveness, both regionally and globally (Mordor Intelligence, 2024). Consumer preferences within the condiment industry vary extensively across regions. In the United States, ketchup remains the most broadly consumed condiment, with an average per capita consumption of 5.1 kg per year (Statista, 2025b). Barbecue sauce, mayonnaise, and mustard also feature prominently among preferred condiments, while olive oil and salad dressings have shown a steady upward trend (Statista, 2025e). Market research continues to underscore the influence of changing consumer habits and dietary trends, reinforcing the need for dynamic and innovative strategies to sustain growth and respond to evolving demand.

Global Trade and Condiments

Condiments and spices hold an important place in international trade, influencing the economic balance of both exporting and importing countries. While the two terms are often used interchangeably, condiments can more accurately be described as blends of spices and flavouring ingredients created to enhance the taste of food once it has been prepared. A summary of how various authors define these terms is presented in Table 3.5 below.

TABLE 3.5. Defining Condiments

SOURCE	DEFINITION
Peter, 2012	Added after serving to enhance food flavour. Condiments often contain spices or extracts. Simple condiments: garlic salt and onion salt. Complex condiments: chilli sauce, chutney, mint sauce, and meat sauce.
Spence, 2018	Mixtures of spices and flavour enhancers. Add to food after serving with the purpose to enhance the flavour profile.
Wilson, 2003	Natural product derived from plants, free from unnecessary constituents. Primarily used as a flavour and aroma enhance of food.
Trust20, 2024	Collection of spices and flavour enhancers. Added post-serving to enhance taste.
Zemser, 2024	Thicker consistency and more intensely flavoured. Formulated to complement dishes or serve as dipping sauces.

Barriers: Labour Demands, Supply Chain Disruption, and Market Volatility

In pursuing organisational excellence, effective operational management remains a cornerstone of success within the condiment sector. Across the global landscape and particularly in South Africa, labour challenges continue to shape production capacity, innovation, and adherence to FSMS. Although South Africa faces a high unemployment rate, the food manufacturing environment continues to struggle with a shortage of suitably skilled workers, a situation often linked to educational and training shortcomings (Ruggles, 2023). The country's unemployment rate of 33.89% reflects not only economic pressures but also the limited availability of qualified professionals in the food and beverage sector (Statista, 2025f). As noted by FoodBev SETA (2019), a shortage of labour, technicians, and quality supervisors presents a concern for long-term growth and operational consistency. The scarcity of food safety professionals, in particular, increases the potential for foodborne incidents, product recalls, and reputational challenges within the South African manufacturing context.

The COVID-19 pandemic disrupted global supply chains, causing delays in supply and demand and driving up production costs. In South Africa, these effects were felt through shortages of raw materials, which directly affected condiment production (Euromonitor, 2024). The sector's performance has also been influenced by declining consumer purchasing power and changing market demands, both of which reflect the country's broader economic instability. Seasonal fluctuations add another layer of complexity, particularly for small and medium-sized enterprises (SMEs) that depend on temporary workers during peak periods. Although this approach offers short-term flexibility, it can lead to inefficiencies, variations in product quality, and heightened food safety risks, while also affecting the organisation's internal culture (Resource Employment Solutions, 2025). Operational constraints continue to undermine market stability, as Pizzemento (2024) observed that logistical difficulties often lead to delivery delays, elevated operating costs, and frequent supply disruptions. Within the South African fast-moving consumer goods (FMCG) sector, which includes condiments, these pressures are compounded by unreliable electricity, water shortages, and weak infrastructure (Ermes *et al.*, 2022).

Alongside these challenges, there is a growing focus on sustainability, ethical sourcing, and fair labour practices. Recent studies show that 81% of consumers consider ethical sourcing as an important factor, and 83% are willing to pay more for products made under fair labour conditions (Banker, 2021; MH&L Staff, 2021). This shift signals that consumer expectations are increasingly shaping how food manufacturers approach production and responsibility within the market.

Risk Profiles Across Condiment Types

Condiment varies in composition and intrinsic risk. Wet condiments, such as emulsified sauces and acidified dressings, contain higher moisture levels and may permit microbial growth if pH, heat treatment, or temperature control are not adequately maintained (ICMSF, 2005; FDA, 2012). Egg-based emulsions present additional considerations where raw or insufficiently pasteurised egg is used, particularly in relation to *Salmonella* spp. (FDA, 2012). Dry products, including spices and herbs, generally have low water activity, which limits the growth of most

pathogenic microorganisms. However, low water activity does not eliminate risk. These products may harbour pathogens such as *Salmonella* spp. or spore-forming bacteria introduced during cultivation, harvesting, drying, or processing, and such organisms can survive for extended periods under dry conditions (ICMSF, 2005; FAO/WHO, 2014). Although microbial proliferation is unlikely under typical storage conditions, contamination can persist and pose a risk if introduced into higher-moisture environments during formulation or consumption.

The Condiment Industry: A Safety Perspective

Beyond economic and commercial considerations, the condiment industry faces inherent risks of contamination that may arise at any stage of production, ranging from cultivation and processing to storage, transportation, and distribution (Reinholds *et al.*, 2015). The safety of condiments is closely shaped by factors such as processing methods, ingredient sourcing and stability, and storage environments. While condiments are generally considered shelf-stable and therefore less susceptible to contamination than many other food products, they are not entirely risk-free. Food safety incidents in this sector has been linked to temperature abuse, inadequate storage conditions, poor handling practices, fragmented regulatory oversight, weak hygiene controls, and the inconsistent quality of raw materials. Spices, a vital ingredient in condiment production, are particularly vulnerable to microbial contamination resulting from agricultural practices, harvesting methods, and post-harvest handling (FAO & WHO, 2022). When spices or herbs exceed acceptable microbial specifications, they can introduce significant food safety hazards during manufacturing.

Additionally, condiments with higher moisture content such as fermented sauces, dairy-based dressings, and wet pastes present an even greater risk. High water activity provides favourable conditions for the growth of pathogens such as *Salmonella*, *Escherichia coli*, and *Listeria monocytogenes*, particularly when hygiene, sanitation, and temperature controls are insufficient (Taniwaki *et al.*, 2019). Also, improper storage and cross-contamination during processing can increase the likelihood of pathogen survival, underscoring the need for vigilant monitoring and consistent food safety management throughout the production chain.

Existing research on condiments largely focuses on production practices (Adadi *et al.*, 2019), scientific investigations into formulation and safety (Mai *et al.*, 2017; Nakamura *et al.*, 2022; Neetoo & Chen, 2012; Reinholds *et al.*, 2015), and evolving health and wellness trends (Flores, 2018; Arévalo-Hernández *et al.*, 2025). However, the narrative review for this research study found a limited body of literature directly addressing food safety assurance within the condiment sector. The limited data availability has also been noted by Mai *et al.* (2017) and Spence (2018), who observed that empirical research on condiments remains relatively underdeveloped compared to other food categories. Findings from studies on fermented legume-based condiments in Nigeria revealed that environmental contamination can occur during processing, underscoring the importance of food safety training for producers as a means to improve safety outcomes (Oguntoyinbo, 2012). Similarly, research examining raw material use during manufacturing has shown that contamination may be introduced during sourcing, harvesting, or storage. Pathogens such as *Staphylococcus aureus*, *Salmonella*, *Bacillus cereus*, and *Clostridium perfringens* have commonly been identified in condiment products (Mai *et al.*, 2017).

A study conducted by the ACT Health Protection Service assessed the microbiological compliance of various condiments sold in retail outlets against the Food Standards Australia New Zealand (FSANZ) Guidelines for the Microbiological Examination of Ready-to-Eat Foods (2001). The results showed high compliance with FSANZ specifications, indicating that consistent monitoring and regulatory oversight support effective safety practices (ACT Health Protection Service, 2015).

The OzFoodNet reported 25 confirmed or suspected foodborne illness outbreaks linked to condiments between January 2013 and March 2014. Most of these incidents were associated with food service establishments such as restaurants and bakeries, where contamination was primarily traced to the use of raw eggs. Other reported cases within the region involved non-egg-based condiments, including gravy in New South Wales (January 2006), potato gravy in

Queensland (February 2012), mushroom sauce in New South Wales (August 2012), and gravy in the Northern Territory (May 2013) (ACT Health Protection Service, 2015). Further evidence from the literature indicates that contamination of substrates in fermented products can lead to the development of toxin-producing microorganisms, thereby elevating the risk of foodborne illness (FAO & WHO, 2022). Allwood *et al.* (2023) emphasised that fermented condiments such as miso require robust FSMS to regulate microbial growth and ensure product safety. Effective implementation of FSMS and regulatory frameworks provides the necessary structure for hazard identification, temperature control, sanitation procedures, and routine testing. Beyond reducing food safety risks, appropriate storage and handling across the supply chain help minimise waste from raw material contamination, supporting operational efficiency and sustainability (Karanth *et al.*, 2023).

In addition to microbial contamination, chemical hazards in condiments present equally significant food safety concerns. These risks often arise from the presence of pesticide residues, heavy metals, and food adulterants; contaminants that can lead to chronic health effects, including carcinogenic and neurotoxic outcomes (Liu *et al.*, 2019; Duan *et al.*, 2025). Several studies have detected elevated concentrations of heavy metals such as lead, arsenic, and cadmium in condiment products, highlighting a persistent global concern. A study conducted in Nigeria reported notably high levels of heavy metals in food crops. This finding underscores the importance of stronger regulatory oversight and supply chain monitoring to prevent contamination at the source (Onakpa *et al.*, 2018). Furthermore, aflatoxins, which are secondary metabolites produced by certain fungi have been frequently recognised in raw materials such as spices when storage conditions are inadequate (Shabeer *et al.*, 2022). These findings reinforce the need for stringent safety protocols, from raw material sourcing to storage, to safeguard both consumer health and product integrity.

National and Regional Consideration Relating to Condiments

Globally, notable progress has been made in strengthening food safety regulatory frameworks, yet many regions continue to face persistent barriers. In developing contexts such as South

Africa, challenges related to labour shortages and fragmented regulatory systems heighten the likelihood of food-related risks. Contributing factors include inadequate food handling practices, poorly maintained production facilities, and recurring water shortages; all of which increase susceptibility to outbreaks (CDC, 2018; Nyarugwe *et al.*, 2020). Amid broader issues such as food insecurity, malnutrition, and economic instability, it is understandable that management attention in some organisations may shift toward maintaining financial sustainability (Fosu-Mensah *et al.*, 2012). In lower-income markets, affordability remains a primary determinant of purchasing behaviour, often outweighing considerations of food safety or nutritional value. Limited access to clean water, sanitation, and healthcare further compounds these challenges, leaving vulnerable populations disproportionately exposed to the health risks associated with contaminated food (Grace, 2015b; Ijabadeniyi, 2013).

Food Safety Culture Consideration in the Condiments Industry

Beyond the role of regulatory frameworks and FSMS, the idea of FSC has, since 2009, become an important focus area within food safety research and practice. The concept was first introduced by Griffith (2006) and later brought into broader discussion by Yiannas (2009). Around the same time, Griffith *et al.* (2010a) developed one of the first frameworks to describe FSC as the shared and learned attitudes, values, and beliefs that shape how people think about and behave toward food safety in their daily work. A few years later, Jespersen and Huffman (2014) identified FSC as an emerging risk, drawing attention to its connection with foodborne outbreaks. Since then, research on FSC has developed into a multidisciplinary field, combining perspectives from organisational culture, food science, and the social sciences. Many researchers now view FSC as a foundation for effective FSMS implementation, while others emphasise its behavioural nature, something that requires ongoing awareness, reflection, and tailored interventions to strengthen (da Cunha *et al.*, 2025a; Sharman *et al.*, 2020). Although the concept has advanced considerably, FSC remains a developing area, with its definitions, language, and theoretical frameworks continuing to evolve.

The evolution of FSC represents a significant shift from traditional, process-driven compliance models toward a more holistic perspective that recognises the influence of human behaviour, shared values, and organisational dynamics. Scholars describe FSC as “a long-term construct existing at the organisational level”. It relates to the deeply rooted beliefs, behaviours, and assumptions that are learned and shared by employees and that influence the organisation’s food safety performance (Sharman *et al.*, 2020: 16). In organisations where FSC is well established, food safety becomes integrated within the organisation’s core values rather than handled as a regulatory requirement. When food safety is integrated into the organisational culture, employees are more likely to act responsibly and uphold best practices without constant oversight. This intrinsic commitment not only reduces the risk of foodborne illness outbreaks but also safeguards brand reputation and financial stability (Griffith *et al.*, 2010a; De Boeck *et al.*, 2017; Zanin *et al.*, 2021a). Within the condiment industry, FSC plays an important role in preventing contamination, maintaining product quality, and protecting consumer health. Key considerations for fostering FSC in this sector include:

- Sourcing and Quality Control – The sourcing of raw materials is required to be from reputable suppliers who adhere to Good Agricultural Practices (GAP) and Good Manufacturing Practices (GMP). Contaminant testing, including pesticides, heavy metals, and microbiological pathogens must be regularly performed.
- Storage and Handling – Suitable storage conditions (cool, dry, and well-ventilated areas) facilitates the prevention of spoilage, mould growth, and insect infestation. Raw material is recommended to be stored in airtight containers to maintain the products integrity and for the prevention of cross-contamination.
- Cross-Contamination Prevention – Raw materials needs to be managed separately from wet ingredients - particularly in food manufacturing environments - to reduce the risk of contamination. All equipment, including utensils, containers, and employee hands should be cleaned and sanitised in accordance with good hygiene practices.
- Microbial Risks – Condiments can support pathogenic microbiological growth such as *Salmonella* and *Escherichia coli*. Spices and herbs which are often incorporated during

the manufacturing of condiments should undergo heat treatments, steam sterilisation, or irradiation to mitigate microbiological hazards while preserving the quality and flavour. *Staphylococcus aureus*, frequently introduced during unhygienic food handling, produces heat-stable enterotoxins that may lead to food poisoning. In the European Union, staphylococcal enterotoxins are major causes of foodborne outbreaks (EFSA, 2015; Hennekinne *et al.*, 2012).

- Allergen Management – Condiments and spices may contain or be exposed to certain allergens. Therefore, proper labelling, segregation, and employee training is important for the prevention of cross-contamination and to ensure consumer safety.
- Expiration and Shelf Life – Generally, raw material used for the manufacturing of condiments have a longer shelf life; however, their potency could decrease over time and can lead to the development of mould or rancidity. The First-In, First-Out (FIFO) inventory management is effective to ensure the correct use of raw materials.
- Regulatory Compliance – Adherence to FSMS and regulatory frameworks is vital for the assurance of safe condiments.

3.3.5 Food Safety: Overview, Frameworks and Industry Standards on the Condiment Peripheral

Food safety governance is guided by international organisations such as the World Health Organization (WHO) and the Food and Agriculture Organization (FAO), both operating under the umbrella of the United Nations (UN). In 1963, these bodies jointly established the Codex Alimentarius Commission (CAC) to develop harmonised food safety standards and guidelines aimed at protecting consumer health and ensuring fair trade practices. The CAC has developed several standards relevant to condiment production, including the General Principles of Food Hygiene (CXC 1-1969), the Standard for Fish Sauce (CXS 302-2011), and the Standard for Chili Sauce (CXS 306-2023). These frameworks provide international reference points for hygiene, quality control, and product integrity within the condiment industry. Table 3.6 provides an overview of the main global and regional regulations for condiments, highlighting the key requirements for ensuring food safety, product quality, and compliance.

Table 3.6. Food Safety Regulations

Safety		Quality	
Regulation 638/2018	Hygiene Requirements	R636/2000	Mayonnaise and salad dressings
Regulation 1145/2004	Mycotoxins		
Regulation 588/2018	Heavy Metals		
Regulation 1054/2009	Melamine		
Regulation 1931/1990	Radioactivity		
Regulation 246/1994	Pesticides		
Regulation 146/2010	Labelling		
Regulation (EC) No 852/2004	Hygiene		
Regulation (EC) No 1169/2011	Food information for consumers		
Regulation (EC) No 2073/2005	Microbiological		
Regulation (EC) No 1333/2008	Food additives		
Regulation (EU) 2023/915	Contaminants		
Regulation (EC) No 396/2005	Pesticides		

As shown in Table 3.7, the key global and regional standards relevant to the condiment industry outline the main requirements for food safety and product quality management.

Table 3.7. Food Safety Standards

Safety		Quality	
SANS 10330	Hazard Analysis Critical Control Points (HACCP)	ISO 9001	Quality Management
SANS 10049	Requirements for Prerequisite Programmes (PRP)		
ISO 22000	Food safety management		

3.3.6 Condiments: Regulatory Considerations

Regulatory bodies oversee all categories of food with the primary aim of preventing foodborne risks and safeguarding consumer health. Table 3.8 provides an overview of these authorities, outlining their mandates, key objectives, and the classification of condiments as a regulated food category.

At the international level, organisations such as the World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the Codex Alimentarius Commission (CAC) have developed frameworks that guide food safety risk management and promote global consistency in standards. Within South Africa, national agencies such as the Department of Health (DOH) and the Department of Agriculture, Land Reform and Rural Development (DALRRD) are responsible for implementing and enforcing these principles. Their oversight ensures compliance with food safety legislation, thereby reducing risks and supporting consumer protection within domestic markets.

Table 3.8. Regulatory Bodies and Condiments

REGULATORY BODY	SCOPE	KEY OBJECTIVES	CONDIMENTS
World Health Organization (WHO) Established in 1948	All food	Reduce foodborne illness, strengthens global food safety, and establishes international standards (CAC). Promotes risk-based assessments and consumer awareness for public health protection.	Global food safety policies. Promotes fortification. Identification of microbiological risks in spices.
Codex Alimentarius Commission (CAC) Established in 1963	All food	International body. Develops food safety standards and guidelines to protect consumer health.	International food safety standards and guidelines includes the condiment sector.
Food and Agricultural Commission (FAO) Established in 1945	All food	Improve nutrition and food security, improves world hunger. Provides technical assistance to member countries. Supports sustainable agricultural practices.	Supports food safety, sustainable agriculture, and trade policies.
International Organization for Standardization (ISO) Established in 1947	All food	Developed ISO 22000. Focused on requirements for food safety managements, global assurance of safe food across supply chains.	Offers international standards for food safety, quality management, and testing.

European Union (EU) Established in 1993	All food	Focused on food safety. Implementation of the General Law Regulation (Regulation (EC) No 178/2002), establishing the European Food Safety Authority (EFSA). Established food safety matters procedures. Incorporated the entire supply chain. Objective to protect public health.	Hygiene (EC No 852/2004), Consumers (EC No 1169/2011), Microbiological (EC No 2023/2005), Additives (EC No 1333/2008), Pesticides (EC No 396/2005).
Department of Health (DOH), South Africa Established in 1945	All food	Foodstuffs, Cosmetics and Disinfectant Act – ensure food safety. Incorporates manufacturing, labelling, sales, and importation of foodstuffs. Manages regulations governing hygiene requirements for food premises and food logistics.	Regulates food safety, additives, contaminants, and labelling. Ensures compliance with food labelling regulations to provide accurate ingredient, nutritional, and allergen information
Department of Trade, Industry and Competition (DTIC), South Africa Established in 2019	All food	Oversees the development and enforcement of regulations to protect consumers against health and safety risks in food product.	Oversees standards and consumer protections laws. Consumer Protection Act: prevention of misleading marketing

			and unfair trade practices.
Department of Agriculture, Land Reform and Rural Development (DALRRD), South Africa Established in 2019	Specific agricultural and processed food products	Agricultural Products Standards Act, 1990: Regulates safety and quality of agricultural products. The Food Safety and Quality Assurance division ensures that agricultural products meet safety standards for local consumption and export.	Regulates quality, composition, and labelling of specific condiments such as mayonnaise, salad cream, and dressings. Established standards for chemical composition and microbiological safety

3.3.7 Food Safety Culture in the Condiment Industry

As the global movement of food across borders continues to expand, the research on food hygiene, food science, microbiology, food nutrition, food process engineering, and environmental health has become increasingly connected. Collectively, these research areas influence global food safety assurance, providing frameworks for national and international standards guiding implementation, management, and compliance. Every area of the food industry faces its own challenges, and the condiment sector is no different. These challenges show the need for the industry to move beyond basic FSMS and regulatory compliance, and to actively build a strong FSC. Strengthening FSC in the condiment industry can, however, be more difficult than in other food sectors. This is often due to the smaller scale of operations, limited infrastructure, and fewer available resources compared to larger food manufacturing environments. For this reason, efforts to strengthen FSC in the condiment sector should be practical and suited to the local context, considering the everyday realities and challenges of production.

An emerging body of research highlights the growing recognition that food safety should not stand apart from organisational priorities but be fully integrated into an organisation's strategic objectives. This approach positions FSC at the heart of the organisation, ensuring that food safety values guide decisions, shape behaviours, and underpin long-term success (Hughes, 2020). Leadership should establish food safety as a strategic goal, encouraging transparent communication towards the fostering of a conducive FSC and supporting all employees to recognise the value of food safety (Ades *et al.*, 2016). In the research, Hughes (2020) contends that having a well-structured food safety strategy is essential to strengthening an organisation's FSMS. Literature on FSC offers a multitude on theories and models, with a simple definition being: "We do what other people do" (Pai *et al.*, 2024; da Cunha *et al.*, 2025a, Sharman *et al.*, 2020). The Global Food Safety Initiative (GFSI) defined FSC as "shared values, beliefs and norms that affect mindset and behaviour toward food safety in, across and throughout and organisation" (GFSI, 2018: 9). One of the most frequently cited definitions is by Griffith *et al.* (2010b: 435), outlining FSC as "the aggregation of the prevailing, relatively constant, learned, shared attitudes, values and beliefs contributing to the hygiene behaviours used within a particular food handling environment".

Researchers increasingly distinguish FSC from FSMS, observing that while FSMS provides the structural and procedural foundation for compliance, FSC extends beyond these systems by reflecting the attitudes and behaviours that shape how food safety is lived within an organisation (Manning *et al.*, 2019). The literature underscores that food safety values, beliefs, and mindsets are collectively formed and shared among employees, influencing how individuals interpret and act on their responsibilities in everyday operations. Within the condiment industry, cultivating a strong FSC is particularly significant, as it builds awareness and shared accountability for managing food safety risks. When food safety becomes an integral part of daily routines and decision-making, employees are more likely to uphold sound practices, thereby reducing the potential for contamination and foodborne illness. Assessing an organisation's FSC requires a comprehensive and inclusive approach that engages employees across all levels, providing insights into leadership commitment, communication, knowledge

exchange, accountability, risk perception, and the wider organisational environment (Yiannas, 2009; Griffith *et al.*, 2010b; Powell *et al.*, 2011). Recognising the evolving nature of FSC remains essential for organisations looking for design interventions that strengthen their underlying dimensions and embed a lasting culture of food safety across all operations (Zanin *et al.*, 2021a; Joomun *et al.*, 2024).

3.3.8 The South African Context

In the South African context, national regulatory frameworks have been established in accordance with international food safety principles. The objective of these frameworks is to oversee and mitigate food safety risks across the supply chain. The primary legislative tool in South Africa is the Foodstuffs, Cosmetics, and Disinfectant Act of 1972, directed by the Department of Health (DOH). The Act sets out hygiene requirements, contaminant limits, and food labelling standards intended to protect consumers through effective enforcement. However, the continued occurrence of foodborne illness outbreaks illustrates the need for ongoing improvement in both food safety management practices and compliance oversight (Nortjé *et al.*, 1999; Thomas *et al.*, 2017).

The Department of Health (DOH), the Department of Trade, Industry and Competition (DTIC), and the Department of Agriculture, Land Reform and Rural Development (DALRRD) serve as the key governmental agencies overseeing food regulation across South Africa's supply chain. The DOH is primarily responsible for enforcing food safety legislation and promoting awareness of hygiene and food safety among both industry stakeholders and consumers (DOH, 2023). The DTIC oversees trade-related food safety matters through the National Regulator for Compulsory Specifications (NRCS), which regulates products such as canned and frozen foods, and processed meat and fish products, whether locally produced or imported (CGCSA, 2023). DALRRD, in turn, ensures compliance with agricultural and food safety standards through instruments such as the Agricultural Products Standards Act and the Meat Safety Act, which also incorporate guidelines for certain condiment products, including mayonnaise and salad dressings (Republic of South Africa, 2008, 1990, 2000).

Despite this structured regulatory environment, practical challenges within the South African context may affect consistent implementation at organisational level. Infrastructure constraints, including water interruptions and electricity instability, can disrupt production continuity and hygiene controls. In addition, staffing variability and limited training capacity may influence the extent to which food safety requirements are implemented in daily practice. These contextual realities underscore the relevance of FSC.

3.3.9 Future Directions

A subset of findings from current literature shows that FSC research has been conducted at schools (Fujisaki *et al.*, 2019), hospitals (Abidin *et al.*, 2014), university food services (De Boeck *et al.*, 2019), and butcheries (De Boeck *et al.*, 2016). These studies have assisted with the understanding of the importance of FSC; however, they provide no evidence to existing barriers within the developing regions. A study conducted at a low-income dairy manufacturer showed how resource constraints, fragmented regulatory frameworks, and culture influences food safety (Nyarugwe *et al.*, 2018). While there is ongoing research focused on FSC (e.g., organisational culture, FSMS, assessment tools), there remains a gap in the SMEs challenged by economic difficulties, namely the condiment industry (de Andrade *et al.*, 2020).

Globally, food safety has improved concerning infrastructure, regulatory oversight, employee training, and document management (Centres for Disease Control and Prevention, 2018; European Food Safety Authority and European Centre for Disease Prevention Control, 2018). The WHO (2015, 2016) underscore concerns within the developing economics, where approximately one-third of global foodborne illness-related fatalities occur. Going beyond the impact on public health, food-related outbreaks have serious social and economic consequences. As soon as food safety non-compliance is identified the manufacturer, government bodies or consumer complaints will initiate a product recall (Lee *et al.*, 2023). Early research by Powell *et al.* (2011) emphasised that organisations have to implement food safety protocols for the prevention of foodborne illness outbreaks. According to Krzyzaniak (2018), the

variability in research methodologies, regulatory frameworks and industry standards create problems in establishing the underlying cause for FSMS failures. Foundational research has demonstrated the importance of a system-based approach aimed at the prevention of food safety failures, emphasising the complexities between the organisation, regulatory frameworks, and human behaviours (Rasmussen, 1997; Pennington, 1997, 2009).

CONCLUSION

This narrative review set out to explore existing literature on the condiment industry; however, only limited information was found, suggesting that future researchers should extend this analysis through a more elaborative and industry-specific framework. Broadly, there remains an urgent need to rethink what food safety truly means and how it is implemented across the food industry. Ensuring that food is both safe and nutritious is a shared global responsibility that extends across all stakeholders, from regulators and manufacturers to consumers. Within the manufacturing sector, the concept of food safety has evolved considerably, encompassing compliance with regulatory frameworks, alignment with global food safety standards, and the influence of rising consumer awareness. As Griffith *et al.* (2010a) observed, this shift underscores the importance of behavioural research that examines how workplace relations, leadership, and training influence compliance and food safety outcomes.

Although progress has been made in improving regulatory oversight, infrastructure, and management systems, foodborne outbreaks continue to occur. A substantial body of literature addresses the evolution of food safety, including developments in food science, the refinement of regulatory frameworks, and the growing recognition of FSC (Pai *et al.*, 2024; da Cunha *et al.*, 2025a; Sharman *et al.*, 2020; Crandall *et al.*, 2017). Yet, within the condiment sector, research remains limited, particularly regarding the interplay between scientific and behavioural dimensions of food safety. Future studies focusing on FSC within condiment manufacturing could therefore provide a valuable framework for identifying and addressing barriers that have so far remained underexplored. Previous research has shown that weak leadership, poor communication, and limited resources contribute to negative food safety outcomes (Pai *et al.*,

2024). Similarly, fragmented regulatory oversight, insufficient technical expertise, and economic constraints can challenge the effective implementation of FSMS.

Globally, a renewed and more inclusive approach to food safety is required; one that re-examines the scientific principles, hazard analysis models, and risk assessment methodologies currently in use, together with regulatory standards and industry best practices. This reframing should prioritise under-evaluated sectors, such as condiments, recognising that the reduction of foodborne illnesses which have remained largely unchanged for nearly two decades depends on shifting prevention efforts beyond procedural compliance toward more enduring improvements in public health outcomes. The future of food safety assurance will therefore depend on leadership that embraces innovation, fosters collaboration, and nurtures valuable cultural and systemic change across all levels of the food industry. Such leadership must look beyond traditional management systems to engage employees as active partners in building FSC, promoting not only compliance but a shared sense of accountability and purpose that strengthens resilience from within.

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CHAPTER 4:

A Secondary Quantitative Data Analysis of The Food Safety Culture at A Prominent South African Condiment Manufacturer

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ABSTRACT

Introduction and Aim

Food safety culture (FSC) plays an important role in the manufacturing of safe food; however, its significance within the condiment industry, particularly in developing regions, remains underexplored. While there is a growing recognition in regulatory frameworks, limited research on FSC in condiment manufacturing, has led to shortcomings in understanding and risk management. Condiments have been reported as a high-risk food commodity due to their unique ingredients and complex processing. FSC has been emerging as a crucial food safety determinant, with added benefits to the broader organisational culture and overall performance. This research study aimed to identify the existing FSC at a wet condiment manufacturing organisation based in South Africa, by investigating the intricate connection between organisational culture and food safety practices.

Methodology

This research study was an analysis of secondary quantitative data, from a consultative project conducted at a wet condiment manufacturing organisation. The study was approved (UFS-HSD2024/1169) by the University of the Free State's General/Human Research Ethics Committee. Written informed consent was obtained in compliance with Protection of Personal Information Act (POPIA). The consulting team collected the survey data; the present study re-analysed the anonymised dataset. The primary data was collected using a survey questionnaire, targeting the entire employee population. The data collection tool assessed various constructs with the aim of determining the FSC maturity. Descriptive statistical analysis was applied to the secondary data to determine maturity scores across the assessed constructs and to identify key barriers influencing the organisation's FSC.

Results

The survey questionnaire had an 83% ($n=158$) response rate. Vision achieved the top score (81%), with a 95% agreement for the question "Food safety is very important to our company", highlighting the importance of food safety across respondents. The remaining constructs scored

below the 80% benchmark: inspiration (67%), empowerment (78%), performance (79%), and change appetite (71%). Leadership and communication emerged as potential barriers. Overall lower scores were identified in the inspiration construct related to respect and decision-making, while empowerment scores highlighted resource concerns. Additional development areas identified were related to recognition, transparency, and trust.

Conclusion

The survey questionnaire findings offered a constructive framework for aligning interventions for the wet condiment manufacturer, and the broader food industry to evaluate and improve their FSC, ensuring a safer food supply chain. These strategies aim to improve the organisational culture, reduce foodborne illnesses, and enhance the safety and quality of food commodities in the condiment industry. The findings showed that there is a need for stronger leadership, communication, and training that will contribute to a conducive FSC. Strengthening leadership practices, improving communication, and ensuring adequate training and resources are essential. By implementing targeted interventions and fostering a culture of inclusivity and transparency, the organisation can ensure sustained excellence in food safety, benefiting both employees and consumers.

Keywords: Food safety culture, condiments, quantitative assessment, leadership, communication, training and skill development

4.1 BACKGROUND

Food safety continues to be a significant global public health concern, despite numerous food safety efforts and decades of research in the areas of microbiology, food safety management and regulations. According to the World Health Organization (WHO), the annual global burden of foodborne diseases is an estimated 600 million cases, leading to 420 000 fatalities (WHO, 2015). This is equivalent to roughly 33 million years of healthy life lost (WHO, 2015). The literature further highlights that when an organisation is implicated as the source of a foodborne illness outbreak, it faces significant reputational harm, financial losses, and increased food waste (Yiannas, 2009; Nyarugwe *et al.*, 2020; Ungku Zainal Abidin *et al.*, 2014). Multiple factors contribute to these food-related risks, including the use of contaminated raw materials, inadequate cooking practices, poor hygiene standards, and failures in processing control (Frankish *et al.*, 2021; WHO, 2009).

The farm-to-fork continuum encompasses a wide range of interdependent entities in which agriculture, primary and secondary processing, packaging, distribution, retail, and hospitality all play essential roles and where human behaviour has a significant influence (da Cunha *et al.*, 2025). Food-related risks, whether biological, chemical, or physical, may be introduced at any point along this continuum; thereby, effectively mitigating such risks requires a holistic understanding of the multi-faceted nature of the food supply chain (Nyarugwe *et al.*, 2016; Havinga, 2019). This complexity has fostered an interdisciplinary interplay between organisational psychology, food safety, consumer science, and public health (Griffith *et al.*, 2017; Jespersen *et al.*, 2016). In alignment with global strategies to reduce foodborne illness, the emphasis in food safety has gradually shifted from purely technical considerations toward a deeper focus on human behaviour (da Cunha *et al.*, 2025; Powell *et al.*, 2011; Wiśniewska & Zamojska, 2015). The emergence of FSC represents this shift, acknowledging the human dimension of food production, distribution, and service, and integrating insights from both the natural and social sciences (Frankish *et al.*, 2023; Olsen *et al.*, 2023).

Scientific literature presents a range of proposed definitions from authors to conceptualise FSC (da Cunha *et al.*, 2025; De Boeck *et al.*, 2017; Frankish *et al.*, 2021; Zanin *et al.*, 2021; Spagnoli *et al.*, 2025). The Global Food Safety Initiative (GFSI) defines FSC as “shared values, beliefs and norms that affect mindset and behaviour toward food safety in, across and throughout an organization” (GFSI, 2018). While the most frequently cited definition in literature is from Griffith *et al.* (2010b), defining FSC as “the aggregation of the prevailing, relatively constant, learned, shared attitudes, values and beliefs contributing to the hygiene behaviours used within a particular food handling environment”. This distinction is largely acknowledged in the literature, with FSC discussions emphasising the collective attitudes, values, and beliefs related to food safety that are jointly maintained by both employees and leadership within the organisation (Griffith *et al.*, 2010a, Zohar *et al.*, 2011; De Boeck *et al.*, 2016; Frankish *et al.*, 2023).

The roots of food safety standards can be traced to the development of the HACCP system and related risk assessment, management, and mitigation frameworks in the 1960s (da Cunha *et al.*, 2025; Wiśniewska & Zamojska, 2015; Havinga, 2019). Building on the Codex Alimentarius food hygiene principles established in 1969, HACCP was later incorporated into European Union legislation in 1991 and subsequently adopted worldwide. This evolution continued with the publication of ISO 22000 in 2005, its integration into the FSSC 22000 certification scheme, and succeeding updates reflected in ISO 22000:2018 and FSSC 22000 Version 6.0 in 2023 (FSSC 22000, 2023).

Similarly, the British Retail Consortium (BRC) standard advanced through continuous improvement, introducing a dedicated Food Safety Culture module in 2018 and formally integrating it into the BRC Global Standards (BRCGS) in 2020. The GFSI further reinforced FSC principles by integrating them into benchmarking requirements across certification systems such as the Safe Quality Food (SQF) and International Featured Standards (IFS) programmes (GFSI, 2018). These developments collectively position FSC as an essential component of food safety management, extending its application across diverse production and processing

environments. Although the underlying principles of FSC remain consistent, challenges and expectations vary across different sectors of the food industry (da Cunha *et al.*, 2025b). The GFSI benchmarking requirements align with international standards and industry best practices, integrating FSC elements into the foundation of FSMS and establishing its assessment as a mandatory expectation (GFSI, 2024). Current research further suggests that FSC evaluation should incorporate employee perceptions, leadership commitment, knowledge sharing, accountability, risk awareness, and the broader organisational environment to capture a comprehensive view of food safety performance (Pai *et al.*, 2024; da Cunha *et al.*, 2025).

During the assessment of an organisation's FSC, quantitative research methods such as survey questionnaires are often regarded as adaptable tools for gathering data on respondents' attitudes, opinions, and perceptions (De Boeck *et al.*, 2017; Zanin *et al.*, 2021). Survey questionnaires enable researchers to record and analyse the number of respondents who provide specific answers, thereby identifying patterns, making predictions, and evaluating the organisation's FSC maturity with minimal disruption to daily operations (De Vos *et al.*, 2012; Laxton, 2004; Bloomfield & Fisher, 2019; Cassim, 2021; Ungku Zainal Abidin *et al.*, 2014). The format also offers respondents a sense of comfort and confidentiality, encouraging them to share their reflections on food safety, leadership, and related organisational aspects with honesty and openness (De Vos *et al.*, 2012). In addition, this method is cost-effective, time-efficient, and enhances the representativeness, reliability, and validity of collected data (Laxton, 2004; Cassim, 2021). However, survey questionnaires are not without limitations, as they may yield low response rates, be subject to misinterpretation by respondents', or result in responses that are not accurately understood by the researcher (Spagnoli *et al.*, 2023; Jones *et al.*, 2013).

The purpose of this secondary data analysis was to examine the existing FSC within a wet condiment manufacturing organisation. This chapter outlines the arrangements for conducting the study and presents the analysis of the secondary data. Drawing on the available datasets, the study aimed to assess the organisation's FSC maturity across key constructs of vision,

inspiration, empowerment, performance, and change appetite and to identify both the opportunities and barriers influencing areas requiring further development.

4.2 METHODOLOGY

This research study is a secondary data analysis of quantitative data from a consultative project carried out at a wet condiment manufacturing organisation in South Africa. A quantitative methodology was adopted to investigate the factors influencing FSC. The methodology referred to in this section links with the overarching methodology described in Chapter 2 of this research study, and the selected methodology pertaining to this chapter, are discussed in the following sections. The study was approved (Appendix G) in terms of ethical requirements by the UFS-CUT ethics committee (UFS-HSD2024/1169). Permission to use the data for further research purposes was granted by both the external data collection entity/consultation company and wet condiment manufacturing organisation. The study population was the full complement of employees of the wet condiment manufacturing organisation, which included direct positions (e.g., supervisors, quality, food safety team) in production and indirect positions (e.g., human resources (HR), maintenance, finance) in administration.

4.3 RESEARCH DESIGN

Secondary data analysis refers to the analysis of data that was collected by another individual. It is an empirical exercise that applies similar research methods and studies using primary data and has steps to be followed in a similar manner as any research method (Cheong *et al.*, 2023; Johnston, 2014). Secondary data analysis can be used in quantitative research for two purposes: 1.) it can be used to investigate new or additional research questions, and 2.) it can be used to verify the findings of previous research (Heaton, 2008).

4.3.1 Original (Primary) Data Collection

The quantitative data were drawn from a survey questionnaire distributed to all employees, with the aim of evaluating the organisation's current FSC maturity level (Laxton, 2004; Bloomfield & Fisher, 2019). This approach provided measurable insights into emerging themes and helped address broader research questions. Quantitative research is inherently objective, allowing data to be statistically analysed and conclusions to be drawn with a defined degree of confidence (Cassim, 2021). However, a key limitation is that not all aspects of human experience or organisational culture can be purposefully reduced to numerical form.

4.3.2 Secondary Analysis Approach (Current Study)

The secondary researcher was given full access to all available and anonymised documentation by the primary investigator. As with any research method, the use of secondary data brings both advantages and limitations. When used carefully, secondary data can contribute valuable insights, inform policy recommendations, guide interventions, and support future studies. Such data are often readily available and can be applied to research questions that differ from those of the original study (Pederson *et al.*, 2020). Key advantages include saving time, improving convenience, and reducing costs. The literature further notes that secondary data use aligns with the ethical responsibility of reducing potential harm by making full use of existing data (Cheong *et al.*, 2023). At the same time, challenges may arise, such as uncertainty about data quality, suitability, or limited understanding of how the data were originally collected (Cheong *et al.*, 2020). These issues can be addressed through careful review and adaptable methods. Even when the primary data were not collected with the same research questions in mind, they can still be effectively used through thoughtful methodological adjustment (Heaton, 2008). In this research study, the research design included an initial analysis of quantitative data from a survey questionnaire, followed by a detailed examination of the available secondary datasets.

4.4 FACILITY SEGMENTATION

The organisation had 190 employees at the time of the assessment, largely sourced from the surrounding community. Census data recorded the region's population at 97 724, with Afrikaans as the dominant language and varied educational backgrounds (STATS SA, 2011). While many have completed secondary schooling, low learner retention rates suggest ongoing socio-economic challenges. Additionally, this demographic and educational setting provides important context for this research study.

4.5 DATA COLLECTION

No sampling was performed for the survey questionnaire, and the entire population was included and invited to participate. The organisations HR department were actively involved during this stage, and provided the necessary guidance, including voluntary consent and adherence to Protection of Personal Information Act (POPIA). To ensure accessibility and support respondents understanding, the survey questionnaire was available in both hardcopy and online formats. Informed consent was obtained, ensuring that participation was voluntary and that all responses would remain anonymous. Both verbal and written information regarding the study was provided to respondents across different shifts, and designated time slots were made available for completing the survey questionnaire over a two-day period.

The areas explored in the survey questionnaire and reported upon in the current research study were related to data collected on following constructs: vision, inspiration, empowerment, performance, and change appetite for food safety. These constructs were tailored to respond to the regional and cultural contexts of the study area, limiting bias, and identify strengths and areas needing improvement within the organisation's FSC (Appendix A). The respondents rated their agreement with the questions on a Likert-scale ranging from 0 (strongly disagree) to 4 (strongly agree), with intermediate options for slight disagreement, slight agreement, and neutrality. The HR department informed the consent process, communicating the purpose and procedures of the intervention to all respondents. Before distributing the survey questionnaire, each of the five constructs were described and explained to ensure a collective understanding.

The data collection instrument employed in the primary research study was based on established methodologies documented in the literature and further refined through adaptation developed in consultative projects for a leading South African organisation specialising in FSC. To ensure content validity, a number of academic and industry specialists participated in the construct formulation and review, primarily reflecting on work done by industry and academe (Griffith *et al.*, 2010; Yiannas, 2009; Jespersen *et al.*, 2016, Nyarugwe *et al.*, 2016). The emergence of FSC as a certification standard was also key to the formulation of themes and constructs, having been conceptualised with the inputs of global role-players by incorporating principles and best-practices from thought-leaders (GFSI, 2018; FSSC 22000, 2023). Reflective feedback sessions to refine the survey themes and formulations were convened with amongst others interest groups at Michigan State University, Department of Food Toxicology and the Central University of Technology, Free State, Centre for Food Sustainability and Biotechnology. Repetitive feedback sessions organised amongst similar groups at different times further enabled test-retest reliability assessment.

4.6 DATA ANALYSIS

The collected data were analysed and statistically presented to provide a comprehensive overview of the existing FSC based on the maturity model. To ensure reliability and validity of the data collection instrument, the internal consistency was assessed using Cronbach's alpha, and the structural integrity was assessed through factor analysis. Descriptive statistics were calculated and included frequencies and percentages, as well as means and standard deviations. The quantitative data from the survey questionnaire was recorded in tabular format in Microsoft Excel, analysed and statistically presented to provide a comprehensive overview of the existing FSC. Also, the frequencies and percentages were applied to display findings in tables and graphs. Spiral plots were used to represent collective responses from the quantitative data. These methods provided an overview of characteristics and patterns within the dataset, enabling the interpretation of findings (Mishra *et al.*, 2019).

When setting an internal benchmark, several approaches may be considered. For instance, establishing an 80% compliance threshold could serve as a practical reference point, provided that factors such as minority effects, industry feasibility, and contextual interpretation are thoughtfully considered. A balanced and holistic approach remains essential to ensure fairness and applicability across different operational contexts. The Pareto Principle, often referred to as the 80/20 rule, suggests that roughly 80% of outcomes stem from 20% of causes. Applying this concept allows organisations to focus on the most influential factors, streamlining decision-making, improving overall efficiency, and fostering a culture that values strategic alignment and continuous improvement (Schoemaker *et al.*, 2023). This principle directly relates to the maturity score 80% rule, where an 80% score is considered acceptable and aligned with general HR performance measures. Similarly, in Likert-scale interpretations used to assess organisational culture, an 80% benchmark is often applied, promoting continuous improvement while acknowledging areas for growth (Maswe *et al.*, 2023). By applying the 80% rule in both performance and cultural assessments, organisations can effectively drive performance and foster an environment of sustained excellence and strategic focus.

In FSC assessments, particularly those based on survey questionnaires, a score of 80% or higher is often viewed as an indicator of a strong cultural foundation. Such results typically reflect that most employees feel engaged, motivated, and aligned with the organisation's values and objectives. This benchmark suggests that the core elements of culture are well established and are positively influencing organisational performance. While a perfect score of 100% may represent the ideal, it is rarely achievable across all cultural dimensions. Setting an 80% target recognises the nuanced and evolving nature of organisational culture, offering a balanced benchmark that signifies strong satisfaction and effectiveness while remaining both realistic and aspirational. The specific benchmark, though, may vary depending on organisational context, industry norms, and defined cultural objectives. Although no studies were found that directly define threshold scores for the South African wet condiment industry, existing literature generally recognises an 80% benchmark as a credible indicator of a positive and resilient organisational culture (Powell & Sammut-Bonnici, 2015).

The maturity model outlined in Table 4.3 serves as a structured methodology that supports the clear and consistent interpretation of FSC assessment outcomes. It provides a framework through which an organisation's food safety practices and culture can be evaluated, reflecting progression from foundational to more advanced levels of maturity (Thorsen *et al.*, 2025). The maturity model assists in identifying organisational strengths and areas requiring improvement by evaluating key dimensions such as employee awareness, leadership commitment, and adherence to food safety protocols, establishing a structured pathway through which organisations can progressively develop a stronger and more proactive FSC over time.

From a methodological perspective, Table 4.3 outlines several options for calculating overall maturity, including averaging scores across questions, constructs, or departments and consolidating these into composite indicators. In the example presented, evaluation categories are applied to assign values or outcomes to specific scores, thereby linking results to a defined performance measure. As illustrated in Table 4.2, the model employs five maturity dimensions: (1) Sustaining Excellence, (2) Proactive and Preventative, (3) Safeguarding, (4) Aware and Responsive, and (5) Reactive and Compliant. It is, however, important to acknowledge that these performance or maturity categories remain context-dependent and internally focused, rather than serving as benchmarks against external industries or broader scenarios (Thorsen *et al.*, 2025). The primary value lies in enabling internal comparison across departments, production units, and operational teams, thereby offering a structured means to monitor progress. Moreover, the model provides a baseline against which organisations can measure future advancements and continuous improvement efforts in strengthening FSC.

4.7 RESULTS AND DISCUSSION

This section presents a secondary data analysis of the findings derived from the survey questionnaire conducted at the wet condiment manufacturer. The quantitative findings were examined and structured according to the sequential progression outlined by the five constructs in the research framework.

The findings offered valuable insights into employees' perceptions of FSC, leadership commitment, and the relative influence of key organisational factors. The findings revealed that "vision" emerged as the highest-scoring construct, suggesting that employees not only understood the organisation's food safety goals and direction but also recognised their relevance to daily operations and long-term objectives. The constructs of "empowerment", "food safety performance," and "change appetite" scored lower, while "inspiration" had the lowest maturity score. This variation suggests a possible inconsistency between the articulated vision and its practical implementation and employee engagement. The "inspiration" construct suggested underlying concerns related to employee motivation, trust, and confidence in raising concerns. Moreover, challenges around "empowerment", "food safety performance", and "change appetite", emphasised aspects where employees reported lower levels of support and engagement.

The box plot in Figure 4.6 illustrates the distribution of scores for each question, aggregated by construct, and serves as a framework for interpreting both the central tendencies and the overall dispersion of responses within the dataset. The "whiskers" indicate the range of values, with the lower whisker reflecting the minimum score and the upper whisker the maximum score within each construct. The box represents the interquartile range (IQR), encompassing the middle 50% of responses, where the lower edge denotes the first quartile (Q1), the central line corresponds to the median, and the upper edge reflects the third quartile (Q3). Values outside this range illustrate the lower and upper 25% of the distribution, providing insight into score variability. The positioning of the median in relation to the mean supports the interpretation of skewness. When the median lies above the mean, the data distribution is negatively skewed (left-skewed), indicating a concentration of higher scores, whereas a lower median relative to the mean reflects positive skewness (right-skewed), suggesting a clustering of lower scores. The absence of statistical outliers further indicates a relatively uniform response pattern across constructs, supporting the validity of the mean as a reliable measure of central tendency.

The survey questionnaire achieved an overall response rate of 83%, with representation from every department across the organisation. This strong level of participation added confidence to the data and suggested that the findings provide a fair reflection of the organisation's wider FSC. Although the response rate was considered a strength of the research study, exceeding the benchmark of 80% (83%), the reasons for non-participation of 17% of respondents may be considered a limitation, considering that 100% participation would be the ideal. Possible concerns about potential repercussions, lack of trust in leadership or scepticism about participation impacts have been considered as possible elucidations for non-participation. However, considering the manufacturing processes inherent in the condiment industry, the likely reason for non-participation, is due to logistical reasons caused by respondents' unavailability while working shifts or absence during the data collection stages.

4.7.1 Vision

The vision construct provided valuable insights into how effectively employees understand and align with the organisation's food safety goals and strategic direction. The consistently high scores across this construct reflected a broadly positive perception of the organisation's food safety vision. As illustrated in Figure 4.1, the spiral plot consolidates responses across all related questions, revealing a relatively homogeneous response pattern. This consistency suggests a strong level of agreement among respondents and indicates that employees share a common understanding of the organisation's overarching food safety aspirations and direction.

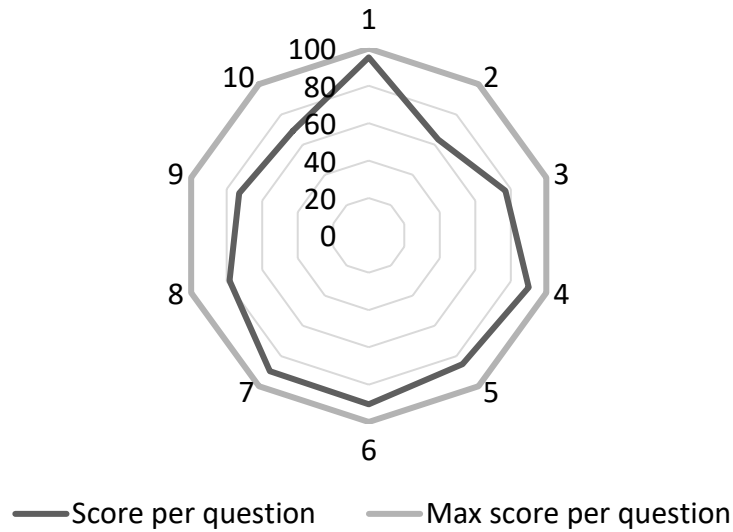


Figure 4.1. Responses relating to the construct: Vision

Vision was the only construct to exceed the 80% maturity benchmark, achieving a maturity score of 81% and positioning it within the safeguarding dimension (Table 4.3). Scores ranged from 63% to 95%, with 50% of responses falling between 72% and 90% (Figure 4.6). Despite a slight left skew, the distribution remained largely central, reflecting a generally consistent and positive response pattern. However, some areas showed marginally lower scores that warrant further attention. The lowest-performing items were questions 2 and 10 (Table 4.1), falling within the bottom quartile (25%), indicating potential opportunities for clarification or reinforcement. The lowest score (63%) corresponded to the question “Our company has effective leadership,” suggesting lingering concerns regarding the visibility and effectiveness of top management. Similarly, the second-lowest score (69%) was associated with “We are made aware of food safety through, for example, discussions, notices, signage, pamphlets, seminars, announcements, and the like,” signalling possible communication gaps related to food safety awareness initiatives. Strengthening leadership alignment and ensuring that leaders at all levels consistently demonstrate commitment through transparent actions, ethical decision-making, and active communication are therefore essential (Pai *et al.*, 2024). Leaders should reinforce the organisation’s food safety vision by modelling the behaviours they expect from others and by

visibly promoting the value of food safety within daily operations (da Cunha *et al.*, 2025; Frankish *et al.*, 2021; de Andrade *et al.*, 2020).

A comparative analysis of the highest and lowest scores revealed a strong employee commitment to food safety, alongside areas of concern relating to leadership and communication. The highest-scoring question, “Food safety is very important to our company” (95%), reinforced the organisation’s strong emphasis on food safety as a core value. As noted in previous studies, a positive FSC begins with management commitment and is sustained through consistent communication across all levels of the organisation (Olsen *et al.*, 2023; Spagnoli *et al.*, 2023). Furthermore, 91% of respondents acknowledged their personal responsibility for food safety, and 90% agreed that food safety remains a management priority. These results reflect a shared recognition of food safety as both a collective and individual responsibility within the organisation. Actively involving employees in setting food safety goals, discussing challenges, and identifying improvement opportunities represents an important mechanism for strengthening FSC. Through participatory decision-making, the organisation ensures that food safety objectives are not only clearly defined but also meaningful and aligned with the broader organisational vision (Griffith *et al.*, 2017; Frankish *et al.*, 2023; Schein, 2004; Taha *et al.*, 2024).

Questions related to food safety communication scored between 63% and 69%, reflecting gaps in leadership engagement and communication practices that may limit the organisation’s overall FSC (GFSI, 2018; Zanin *et al.*, 2021). Establishing clear, transparent, and consistent communication regarding food safety goals and expectations is therefore critical (da Cunha *et al.*, 2025; Griffith *et al.*, 2010a; Taha *et al.*, 2025). This includes providing regular updates from leadership, maintaining formal communication channels such as newsletters and meetings, and encouraging informal interactions through direct discussions and feedback (Kouzes & Posner, 2007). Effective communication should also be simple, accessible, and tailored to employees at different levels of the organisation. Addressing these identified gaps can strengthen leadership visibility and enhance the overall maturity of the organisation’s FSC (Pai *et al.*, 2024; Griffith *et al.*, 2010a; GFSI, 2018).

The pivotal role of leadership in shaping and sustaining food safety standards is well documented (Powell *et al.*, 2011; Yiannas, 2009; Taha *et al.*, 2025). Although food safety is clearly prioritised within the organisation and employees demonstrate awareness of their responsibilities, leadership effectiveness and consistency in modelling compliance remain areas for development. Drawing on Bandura's Social Learning Theory, employees learn through observation and imitation of behaviours demonstrated by others, particularly those in positions of authority. Consequently, when leaders actively display commitment to food safety, they reinforce expected norms and motivate employees to emulate these behaviours (Pai *et al.*, 2024; Stedefeldt *et al.*, 2015; Yu *et al.*, 2021). Cultivating a shared sense of purpose around food safety that resonates across all levels of the organisation can further strengthen the vision construct. This may be achieved by embedding food safety principles within the organisation's mission and vision statements and by ensuring that every employee understands how their individual role contributes to achieving collective food safety objectives.

The findings highlighted a strong organisational foundation in communicating the organisations food safety vision. However, the lower-scoring questions pointed to areas where clearer articulation, stronger leadership engagement, and more transparent communication could further reinforce the vision construct. These insights provide a valuable basis for developing targeted interventions and strategies aimed at enhancing overall FSC maturity. Embedding food safety objectives within the organisation's broader strategic planning processes and ensuring that the long-term vision for food safety is integrated into core business decisions, can further contribute to a more cohesive and resilient culture of food safety.

4.7.2 Inspiration

The inspiration construct evaluated employees' commitment, involvement, and active participation in sustaining and advancing food safety, with trust in leadership emerging as a critical factor in fostering accountability. Although the term inspiration may be inherently subjective, it encompasses key aspects of employee engagement, motivation, and sense of

purpose (Ungku Zainal Abidin *et al.*, 2014). These leadership dimensions are fundamental to cultivating trust, loyalty, and responsibility among employees, thereby strengthening collective commitment to FSC (Zanin *et al.*, 2021; Taha *et al.*, 2025). Achieving lasting and impactful integration of food safety within the organisational culture requires not only knowledgeable and compliant employees but also motivated and engaged ones (Jespersen *et al.*, 2016; Jha, 2016). The findings reflected a strong sense of individual commitment, particularly in customer care and accountability; however, lower scores pointed to opportunities for improvement in areas related to collective decision-making and employee recognition.

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Despite comparatively higher overall scores, the right-skewed distribution indicated a concentration of lower individual responses. Concerns relating to leadership, communication, and employee involvement were evident, with the questions "My opinion is valued and respected" and "My company cares about its people and makes them a priority" both receiving scores of 55%. As a critical element of FSC, it is essential that the organisation creates opportunities for employees to contribute to the development of food safety policies, procedures, and goals. When employees are actively involved in shaping food safety initiatives

and perceive their input as valued, it fosters a sense of ownership, strengthens participation, and enhances pride in maintaining food safety standards (Pai *et al.*, 2024; Zanin *et al.*, 2021). Developing reward and recognition systems that acknowledge employees who demonstrate strong commitment to food safety forms an integral part of a mature FSC. Such initiatives may include formal recognition programmes that celebrate individual or team contributions to food safety improvements (Zanin *et al.*, 2021; Spagnoli *et al.*, 2023; The Alliance, 2025). Overall, these findings emphasise the need to strengthen inclusivity and engagement within decision-making processes to further integrate a sense of shared responsibility and accountability across the organisation (Frankish *et al.*, 2023; Taylor *et al.*, 2015; Dollard *et al.*, 2010).

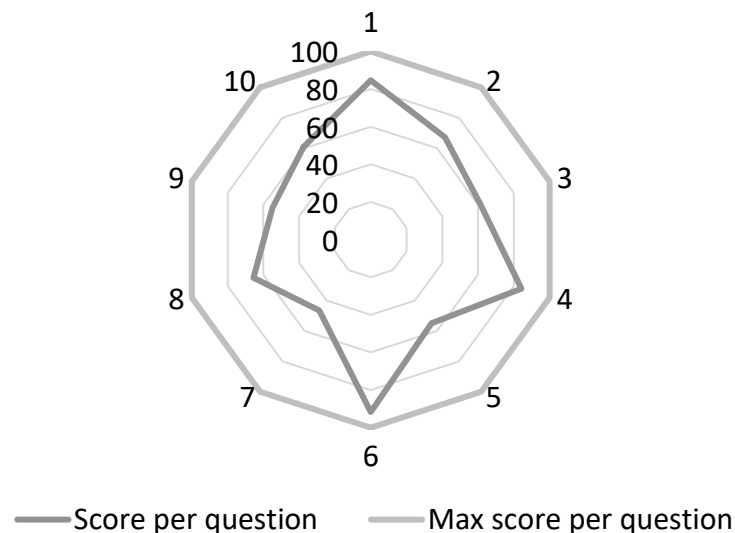


Figure 4.2. Responses relating to the construct: Inspiration

A notable contrast emerged between the sub-constructs “My opinion is valued” (55%) and “I care for our customers” (92%), reflecting strong employee commitment to food safety but revealing limitations within the organisational culture and leadership engagement. It is essential for leaders at all levels to take an active role in food safety practices, setting behavioural standards that clearly demonstrate the importance of safety. When leaders visibly engage in food safety activities, they encourage employees to model similar behaviours and reinforce the perception that individual contributions are both valued and recognised (Pai *et al.*, 2024;

Bandura, 1986). High scores for “I am eager and able to report apparent food safety risks and violations” and “I do not allow food safety violations in my area” further confirm employees’ dedication to upholding food safety standards. Bridging the gap between individual commitment and organisational engagement remains critical. Strengthening employee participation in decision-making processes and ensuring that their perspectives are respected can enhance FSC and promote a more inclusive working environment (Jespersen *et al.*, 2016; Nayak & Waterson, 2017; Taha *et al.*, 2024).

As part of fostering a positive FSC, leadership should focus on developing employee engagement and cultivating a shared sense of belonging. Creating an inclusive environment that encourages employees to express ideas and contribute to food safety initiatives will not only strengthen trust and collaboration but also advance the organisation’s overall FSC maturity (Zohar & Tenne-Gazit, 2008; de Andrade *et al.*, 2020; Olsen *et al.*, 2023). The relationship between FSC, employee morale, and organisational success is well established in the literature (da Cunha *et al.*, 2025; Powell *et al.*, 2011; Wiśniewska & Zamojska, 2015). When committed employees are excluded from decision-making processes, it can negatively affect both FSC and overall organisational performance (Yiannas, 2009; Olsen *et al.*, 2023). Consequently, a lack of engagement or a sense of being overlooked may lead to reduced compliance, even among employees who remain dedicated to food safety principles.

Organisational culture also plays a pivotal role in shaping employees’ perceptions, engagement, and commitment (Ball *et al.*, 2010; De Boeck *et al.*, 2015; Olsen *et al.*, 2023). By fostering a culture in which all employees understand the importance of food safety beyond regulatory compliance and recognise how their collective commitment protects consumers, enhances organisational performance, and mitigates food safety risks, the organisation can cultivate a more proactive and resilient FSC.

4.7.3 Empowerment

The empowerment construct reflects employees' perceptions of having suitable resources, relevant training, and the capacity to contribute effectively to food safety within their respective roles. Examining the multifaceted nature of empowerment as observed within the organisation provides valuable insight into how these elements interact with overall organisational performance. Strengthening clarity around individual roles and responsibilities in relation to food safety is fundamental to fostering a sense of empowerment among employees (Pai *et al.*, 2024; De Boeck *et al.*, 2017). The findings revealed that, while employees generally demonstrated confidence and competence in food safety practices, notable variation existed in the availability of training opportunities and access to resources.

Figure 4.3 illustrates the collective responses across inter-construct questions, while Table 4.1 identifies the outliers. The empowerment construct underscored the importance of ensuring that employees have access to the essential resources required to uphold food safety. As shown in Figure 4.6, empowerment displayed the narrowest score distribution (61%–91%, range 30%) and the lowest interquartile range (IQR) of 13, indicating a high level of response consistency. Notably, 50% of responses clustered between 71% and 84%, with both the mean (78%) and median (78.5%) reflecting a central tendency. This concentration of scores suggests strong alignment in employee perceptions, identifying empowerment as an area underscoring the need for further exploration and development.

The findings revealed a high willingness to learn (91%), contrasted by lower scores relating to training effectiveness (61%), indicating possible limitations in training access or quality. These results suggest that the organisation would benefit from fostering a stronger culture of knowledge sharing by creating opportunities for employees to exchange insights and best practices across departments. Existing literature emphasises that continuous learning and development initiatives form a cornerstone of a robust FSC, ensuring that employees remain both informed and empowered (Pai *et al.*, 2024; Luning & Marcelis, 2007).

While overall empowerment scores were relatively high, several concerns emerged. The lowest score (61%) for “Employees are not allowed to operate without adequate training” raised questions regarding the quality of training, the rigour of organisational procedures, and the level of leadership involvement. To enhance training effectiveness, the organisation would benefit from implementing readily accessible, relevant, and comprehensive training programmes that integrate participation across all hierarchical levels, thereby ensuring that employees have the essential competencies required to contribute to food safety objectives. Training initiatives should be regularly reviewed and updated to reflect current best practices, new regulatory developments, and emerging food safety concerns (Olsen *et al.*, 2023; Spagnoli *et al.*, 2025; Taha *et al.*, 2025).

The second-lowest score (66%) related to equipment maintenance, signalling potential gaps in resource allocation and management practices. Ensuring that employees have consistent access to appropriate tools, equipment, and infrastructure is critical to enabling them to perform their roles effectively and uphold food safety standards (Frankish *et al.*, 2023; Zanin *et al.*, 2021; Wiśniewska & Zamojska, 2015). A lack of empowerment can lead to frustration, disengagement, and an increased likelihood of unsafe practices. Given the central role of compliance and regular equipment maintenance in operational effectiveness, these findings highlight key areas that require timely and continuous attention.

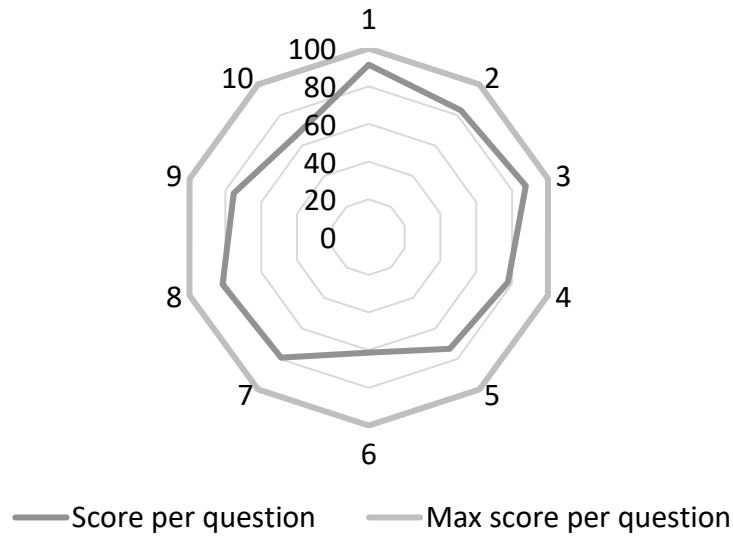


Figure 4.3. Responses relating to the construct: Empowerment

While ongoing concerns were identified regarding training, equipment maintenance, and overall training effectiveness, the empowerment construct achieved a maturity score of 78%. Training-related scores (61%, 66%, and 73%) revealed notable gaps, with 25 respondents assigning a score of zero for training adequacy and 22 respondents rating a three, indicating varied and mixed perceptions across the workforce.

Questions related to training and related scores:

“Employees are not allowed to operate without having received adequate training”: 61%

“Faulty, inadequate, or old equipment is replaced and/or maintained regularly”: 66%

“The training we receive is effective and suitable”: 73%

Most respondents recognised the importance of training, although concerns about inadequate or inaccessible policies indicate the need for further investigation. Ensuring that employees have role-specific access to key documents, such as food safety guidelines, protocols, and standard operating procedures would promote a shared understanding and contribute to a stronger FSC (de Andrade *et al.*, 2020).

Respondent scores reflected a strong motivation to learn, with high levels of agreement for statements such as “I am eager to practice and obtain new knowledge and skills” (91%), “I know the implications and dangers associated with food safety” (88%), “I have the skills and tools to do my work well and with confidence” (83%), and “In our company, provision of resources to ensure food safety is equally important in all sections” (82%). However, the findings also revealed inconsistencies between perceived training effectiveness and actual accessibility, likely influenced by individual experience, organisational policies, or variations in training quality (Pai *et al.*, 2024; Zanin *et al.*, 2021). Addressing cognitive biases, such as self-serving bias and fundamental attribution error may help to clarify these misalignments in perception. Differentiating between employees’ self-assessed competence and their perceptions of the organisation’s responsibility for training is essential for designing effective and targeted development programmes (Lawrence, 2025; Spagnoli *et al.*, 2023). While empowerment within the organisation appears strong, enhancing training quality, improving access to essential resources, and recognising employee contributions would further strengthen employees’ ability to manage food safety risks effectively. Collectively, these findings underscore the importance of continuous learning, transparent communication, and recognition as drivers of a resilient and sustainable FSC (Powell *et al.*, 2011; Stedefeldt *et al.*, 2015; Nyarugwe *et al.*, 2016).

Empowerment is strengthened when food safety becomes an inherent component of the organisational culture. Giving employees the autonomy to make food safety–related decisions within their areas of responsibility fosters a sense of ownership and accountability, particularly in identifying and responding to food-related risks (Pai *et al.*, 2024; Spagnoli *et al.*, 2023).

4.7.4 Performance

Performance, as defined in the FSC assessment tool, refers to the maintenance of effective and responsive documented FSMS and tools, encompassing compliance and risk assessment mechanisms, monitoring activities, metrics, evaluations, outcomes, achievements, and measures for continuous improvement. Food producers and distributors carry an obligation to apply sound judgement and proactive consideration to ensure product safety, extending beyond

the minimum requirements of regulatory limits and standards. It is therefore essential for food manufacturers to demonstrate a continuous commitment that goes beyond compliance, actively mitigating food safety risks and reinforcing consumer trust (Pai *et al.*, 2024; da Cunha *et al.*, 2025). Failure to comply with food safety protocols can result in significant consequences, ranging from formal reprimands and customer complaints to audit failures, supplier delisting, or even large-scale product recalls (Pai *et al.*, 2024; Spagnoli *et al.*, 2025). The findings provided valuable insights into the organisation's perspectives, strengths, and barriers relating to the various dimensions of food safety performance.

The results indicated that most employees hold a positive perception of the organisation's food safety performance, as reflected in consistently high scores across sub-constructs such as auditor regard, regulatory compliance, and customer complaint management. Figure 4.4 illustrates the consolidated responses, while Table 4.1 highlights the lowest-scoring questions within this construct. Although overall perceptions were favourable, the performance construct identified opportunities for improvement in areas related to recognition and transparency. The findings further suggested a strong association between trust and transparency, indicating that open communication and acknowledgment of performance achievements are integral to strengthening the organisation's FSC.

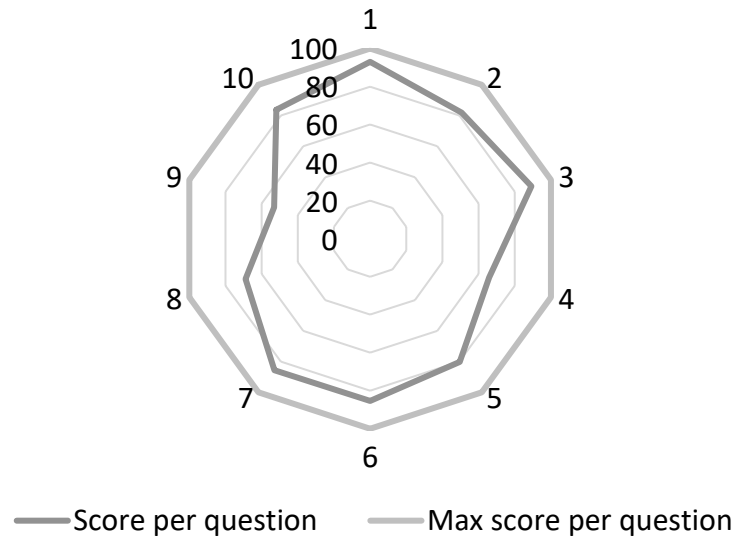


Figure 4.4. Responses relating to the construct: Performance

With a maturity score of 79%, this construct was positioned within the safeguarding dimension (Table 4.3). However, the data reflected a left-skewed distribution, with 50% of responses ranging between 68% and 86%, and an overall range from 53% to 93%. The lowest scores (53% and 66%) pointed to concerns related to recognition and communication. The lowest-performing question, “We are recognised and acknowledged for exceptional food safety performance” (53%), highlighted underlying issues in employee sentiment, leadership visibility, and reward systems. Similarly, the second-lowest score, “Outcomes of inspections and audits are transparent and shared with all staff” (66%), suggested limited employee participation and recognition in food safety processes. Recognising and celebrating food safety achievements, whether through meeting audit requirements, maintaining incident-free operations, or achieving measurable improvements reinforces the importance of performance and motivates employees to sustain excellence in practice (GFSI, 2018; Yiannas, 2009; Taha *et al.*, 2025).

The results further demonstrated a strong organisational commitment to food safety regulations. Respect for auditors and inspectors was evident, with “Auditors and inspectors are treated with respect and appreciation when visiting our facilities” achieving a score of 93%, and “Our company regards regulatory and compliance inspections and audits as important and

beneficial” scoring 89%. Employees also displayed high adherence to regulatory protocols, with “Regulatory protocols and policies are respected and understood” reaching 82%, underscoring consistent compliance behaviour. However, a disconnect emerged between compliance performance and recognition, as reflected in the 53% score for “We are recognised and acknowledged for exceptional food safety performance”. This gap suggests that while compliance is prioritised, employee acknowledgment may be inadequate, potentially influencing levels of inspiration and motivation. Introducing structured reward programmes such as recognition initiatives, performance-based bonuses, or career development opportunities linked to food safety targets could strengthen engagement and reinforce the value of maintaining high standards. To further enhance FSC maturity, the findings pointed to the need for improved communication regarding audit outcomes (66%) and greater recognition of food safety achievements (53%), even though adherence to updated management systems remained strong (80%).

Enhancing food safety performance requires the active engagement of employees across all levels of the organisation. Fostering an inclusive organisational environment and improving cross-functional communication can empower employees to identify potential risks and contribute constructive suggestions for improvement (GFSI, 2018; Wiśniewska & Zamojska, 2015). Celebrating food safety achievements plays a vital role in reinforcing morale and sustaining employee engagement, with the high level of loyalty (84%) further demonstrating the organisation’s strong commitment to food safety. While overall performance is perceived positively, further emphasis on communication, transparency, recognition, and the celebration of achievements could enhance engagement and external visibility, thereby reinforcing and advancing the organisation’s FSC.

4.7.5 Change Appetite

Change appetite is defined as “the agility of a food company to respond to change in terms of food safety advancement, its identity related to collegial and cultural tolerance, adaptability to novel food safety challenges and demands, response to critique, and appetite for renewal”. This construct assessed the organisation’s capacity to adapt to food safety improvements, with emphasis on cultural adaptability, openness to feedback, and responsiveness to change. Organisations that cultivate an adaptive culture are generally more effective in guiding employees through transitions, as change is perceived as an opportunity for growth rather than a potential disruption (GFSI, 2018).

The spiral plot in Figure 4.5 illustrates the response distribution, while Figure 4.6 presents the overall maturity score of 71%. This construct showed slight negative skewness, with a mean of 71% and a median of 72.5%, indicating a relatively broad distribution and reflecting opposing perspectives or inconsistent experiences among employees. Overall, employees demonstrated readiness for change, as shown by the high scores on questions relating to their willingness to engage in change processes and their belief in the positive outcomes of such initiatives.

Despite this general openness, concerns remained regarding equity and communication. The lowest-scoring question, “All employees enjoy the same opportunities and recognition” (47%), pointed to uneven access to opportunities and inconsistent recognition across employee groups. Similarly, “I am informed about change plans and processes” (54%) highlighted challenges in communication, leadership visibility, and participatory involvement. In managing organisational change, fostering engagement and trust is essential to strengthening communication channels and promoting inclusive decision-making (Spagnoli *et al.*, 2023). Leadership should also ensure that equity and representation are embedded within decision-making structures related to the development of food safety policies and procedures, cultivating an environment that values diverse cultural, gender, and hierarchical perspectives (Pai *et al.*, 2024; GFSI, 2018; Zanin *et al.*, 2021).

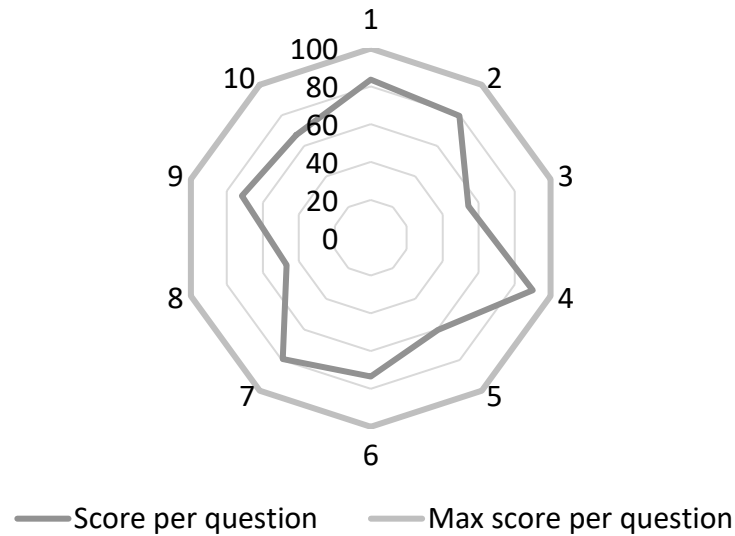


Figure 4.5. Responses relating to the construct: Change appetite

Barriers related to fairness, recognition, communication, and diversity; all critical elements of employee engagement were highlighted by the suboptimal scores obtained in this construct. Fostering an inclusive work environment, enhancing morale, and strengthening organisational adaptability remain areas requiring focused attention. A particularly noteworthy concern was perceived inequality with an overall score of 47%, 36 respondents ($n = 36$) assigned a score of zero to the question “All employees enjoy the same opportunities and recognition”. This finding suggests issues relating to unclear standards, potential bias, or insufficient communication, which may negatively affect employee motivation and trust. Strengthening engagement therefore requires reinforcing impartial leadership practices and implementing consistent recognition systems to ensure fairness and transparency across all organisational levels (Pai *et al.*, 2024; Lee *et al.*, 2023).

The question “Our company supports diversity and equality” achieved 60% agreement, with a significant number of respondents scoring between zero and two, indicating unhappiness with the organisation’s equity and inclusion efforts. Effectively communicating the organisation’s position on diversity and inclusion is integral to the broader food safety strategy. Ensuring that food safety policies are accessible to all employees, removing barriers to participation, and

incorporating diverse perspectives in food safety–related decision-making are essential components of a strong FSC (GFSI, 2018).

Similarly, the question “I am informed about change plans and processes” (54%) highlighted communication limitations, suggesting that many employees may have limited awareness of ongoing change initiatives. When disconnects arise between management and employees, they can contribute to a culture of uncertainty and exclusion. It is therefore crucial to reinforce transparent and inclusive communication practices to strengthen trust and engagement across all levels of the organisation. Clearly communicating proposed changes; including their purpose, anticipated impact on food safety practices, and employees’ roles in their implementation can enhance clarity, build trust, and encourage shared ownership of change processes (Pai *et al.*, 2024; Taha *et al.*, 2024).

Effective communication plays an essential role in organisational effectiveness (Yiannas, 2009; Spagnoli *et al.*, 2023). Employees who understand and internalise food safety regulations tend to demonstrate greater accountability and collective responsibility toward maintaining food safety standards (Yiannas, 2009). This aligns with the Communication Theory of Identity, which suggests that organisational identity is shaped and reinforced through patterns of communication (Hecht, 1993). While most employees reported feeling valued and appreciated, the working environment appeared only partially inclusive, suggesting the presence of potential biases or biases that may affect engagement and overall organisational culture. Recognition, similarly, serves as a key mechanism for reinforcing positive behaviour, consistent with the principles of Social Exchange Theory (Blau, 1964). According to Blau (1964), when employees perceive fair recognition and unbiased reward, they are more motivated to engage in behaviours that uphold food safety practices. The question “I am willing to participate in the process of change” received 90% agreement, though several respondents scored zero, which may indicate limited understanding of change processes, internalised biases, or department-specific challenges. Strengthening communication and ensuring impartial representation across

departments are therefore essential to addressing these differences and reinforcing trust in organisational change initiatives.

Intermediate scores on cultural variance and change appetite offered significant insights into food safety management practices; however, trust in leadership, inclusivity, and cultural sensitivity remain key areas for development. Moderate levels of innovation, with scope for further development, were reflected in sub-constructs related to respect for personal orientations and cultural awareness. The 80% score for “I trust our leaders to handle change processes effectively and fairly” indicated an overall confidence in leadership, though concerns persisted regarding fairness and consistency in change management practices. Strengthening trust and transparency in leadership through inclusive and participatory decision-making will be essential to advancing the organisational maturity. While employees expressed general trust in leadership, the findings highlighted the continued need for improved communication, openness, and fairness; particularly in managing change. Encouraging employee participation in the design and review of food safety protocols aligns with participative management principles, which promote engagement, shared accountability, and ownership (Cotton *et al.*, 1988; Taha *et al.*, 2024). Employee engagement, defined by Kahn (1990) as the physical, cognitive, and emotional investment of individuals in their work roles, strengthens when employees feel valued and respected. In these environments, employees transition from passive compliance to active contribution in sustaining food safety standards. Enhancing communication, participation, and recognition will therefore further reinforce the organisation’s FSC and overall maturity.

The secondary data analysis revealed notable differences in employees’ perceptions of the organisation’s FSC. While the highest-scoring questions reflected a strong willingness to contribute and a deeply rooted belief in the organisation’s vision and mission, the lowest-scoring questions highlighted ongoing concerns regarding leadership’s recognition of employee contributions and limited opportunities for participation. These findings emphasise the importance of fostering cross-functional collaboration in food safety initiatives and enhancing

leadership involvement to actively engage employees, thereby capitalising their commitment and strengthening the organisation's overall FSC.

4.7.6 Comparative Maturity Score per Construct

In this section, the scores are interpreted in relation to the overall response patterns and the established benchmark of 80%. Overall scores were satisfactory, with vision achieving the highest score (81%) and inspiration the lowest (67%), with only the vision construct exceeding the 80% maturity benchmark (McKinsey, 2021; PwC, 2023). Previous research suggests that in positive and stable organisational environments, change appetite often scores lower (71% in the present research study), as employees perceive the organisation to be functioning effectively and therefore see less need for change (Joharishirazi & Chehelmard, 2015). However, lower scores may also reflect misconceptions about change, which can sometimes be viewed as disruptive or associated with negative social outcomes.

To address this, the organisation may benefit from redefining change as a tool for renewal and agility; an enabler of improvement rather than a signal of instability. Establishing a shared food safety vision that aligns with strategic objectives, while ensuring inclusivity and representing the interests of all employees, can foster collective ownership and strengthen commitment to food safety performance (Yiannas, 2009). The relatively low score for inspiration further reinforces the need to strengthen its underlying sub-constructs, particularly those related to employee motivation, recognition, and leadership engagement.

4.7.7 Intra-construct Scores

This section identified response patterns across constructs by assessing significant outliers and variations in individual question scores. Communication consistently emerged as a recurring theme among the lowest-scoring questions, though situated within different constructs. This was particularly evident in areas related to recognition and transparency. The same correlation was observed within the change appetite construct, underscoring persistent challenges in information sharing and managing operational transitions. In addition, recurring themes of

fairness, diversity, and equality were noted across multiple constructs. Noteworthy comparisons were revealed through the descriptive data trends. Within inspiration, the contrast between “My opinion is valued” and “I care for our customers” mirrored that of the change appetite sub-constructs “I think change will be good” and “All employees enjoy the same opportunities and recognition”. These parallel patterns support data reliability and reflect shared perceptions among respondents.

An important reflection arising from these findings concerns the degree to which support departments; although not directly involved in food handling fully understand their role in fostering FSC within the broader organisational context. For example, the HR department can contribute by facilitating training, resource allocation, and skills development initiatives to strengthen FSC-related interventions. Similarly, quality assurance, compliance, and new product development portfolios manage aspects related to food safety performance, while resource and maintenance teams influence environmental and infrastructural outcomes. Active participation of these departments as food safety champions; for instance, through internal awareness or marketing campaigns can improve not only organisational culture but also external credibility and market positioning.

This finding extended to operational dynamics, as found in the data. Shared departmental perspectives indicated an emerging “us versus them” culture, suggesting limited engagement between line authority and departmental teams. Table 4.1 presents the lowest-scoring questions “I am part of food safety decision-making” and “All employees enjoy the same opportunities and recognition” (both 47%), which highlight concerns related to information sharing, transparency, and inclusivity in change management processes. Radial plots further illustrated consistent patterns across sub-constructs, with fairness, equitability, and team spirit also receiving comparatively low scores.

A comparison of the highest- and lowest-scoring questions across constructs showed differing viewpoints in how respondents perceived their significance, readiness for change, and overall assessment of the organisation's food safety commitment. The recurring low scores consistently suggested limitations in leadership, communication, training, resources, and equality. Collectively, this cross-construct integration suggests the presence of systemic barriers that need to be addressed to strengthen the organisation's FSC and improve the overall maturity.

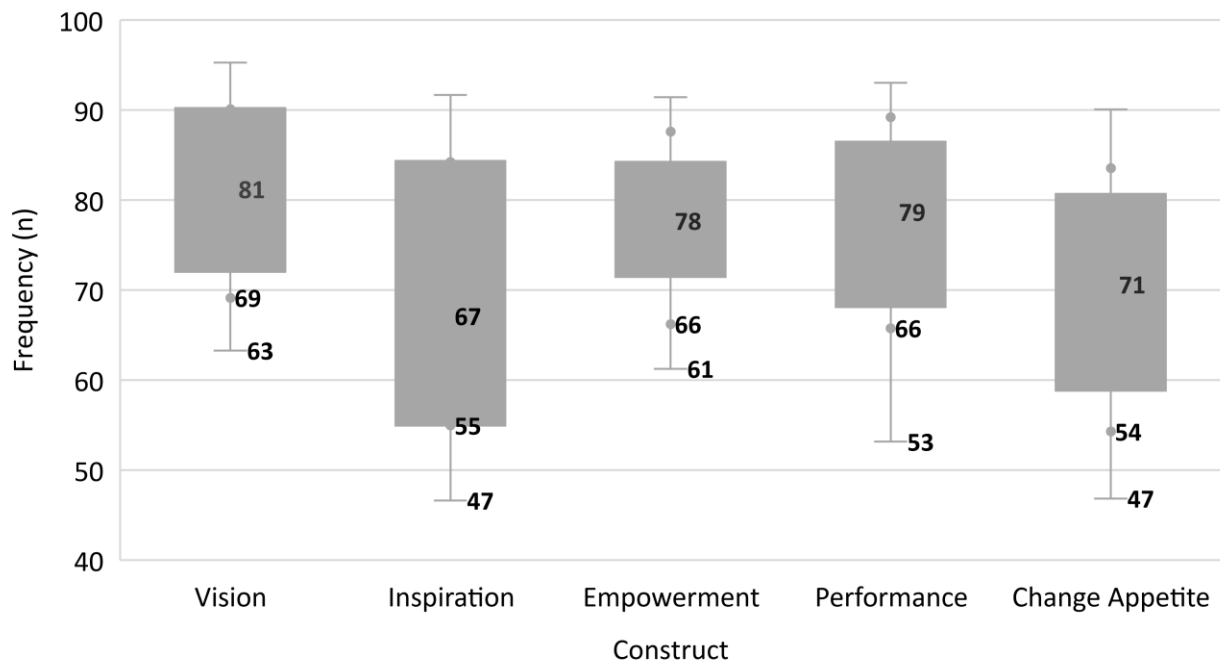


Figure 4.6. Box Plot per Category by Score Per Question

CONCLUSION

This secondary data analysis explored the existing FSC within a prominent wet condiment manufacturing organisation in South Africa. The aim was to determine the current level of FSC maturity and to examine the constructs that inform and influence employee behaviour. Each construct was analysed in isolation to identify specific strengths and weaknesses, followed by a comparative analysis across constructs. Leadership and communication emerged as key barriers to FSC maturity, alongside challenges related to decision-making, respect, and empowerment.

Recognition, transparency, and equality also required attention, with low transparency scores suggesting limited trust between leadership and employees.

Achieving a strong FSC requires visible commitment and active participation from every level of the organisation. A positive FSC depends on creating an environment that prioritises the prevention of foodborne illnesses and ensures compliance with health regulations through safe practices, hygiene, and risk management (Pai *et al.*, 2025; De Boeck *et al.*, 2017; Frankish *et al.*, 2023; da Cunha *et al.*, 2025). It emphasises adherence to standards and protocols, combined with continuous monitoring to safeguard public health. Despite strong employee commitment to food safety, shortcomings in leadership effectiveness, communication, and decision-making persist. These findings highlight a disconnect between employees' dedication to food safety and their perceptions of leadership support and engagement. Leadership must actively prioritise food safety, allocate appropriate resources, and model expected behaviours to inspire employee confidence. The inspiration construct suggested that while personal commitment to food safety is strong, employees feel excluded from decision-making processes and unrecognised, which may lead to disengagement and weaken cultural cohesion. Bridging the gap between high personal responsibility and low involvement requires leadership to promote transparent communication and inclusive decision-making. Recognising and valuing employee contributions is crucial for cultivating an engaged organisational environment (Pai *et al.*, 2024; Ungku Zainal Abidin *et al.*, 2014).

The empowerment construct scored relatively high; however, inconsistencies in training quality and equipment maintenance point to areas for targeted improvement. Providing adequate, role-specific training and ensuring that infrastructure and equipment are regularly maintained are essential to sustaining high food safety standards. Addressing these shortcomings would enhance employee empowerment and readiness to manage food safety risks effectively. The performance construct demonstrated strong assurance in regulatory compliance and adherence to management systems. Nonetheless, concerns related to recognition and audit transparency highlighted the need for improved employee engagement. Acknowledging achievements and

maintaining open communication about audit results can foster trust and reinforce accountability (Lee *et al.*, 2023; Frankish *et al.*, 2023; Yiannas, 2009). Similarly, moderate change appetite scores emphasised the need for equitable opportunities and more transparent communication to support adaptability. Although employees expressed willingness to engage in change processes, perceived inequities and limited information sharing created uncertainty and restricted overall readiness. Addressing these gaps will be crucial to improving organisational agility and resilience.

While this quantitative assessment focused on a single wet condiment manufacturing organisation, it provided a clear and representative view of the organisation's FSC. A key strength lies in the high survey response rate of 83%, which ensured full departmental representation and strengthened confidence in the reliability of the results. The breadth of participation and the structured design of the survey questionnaire allowed for strong comparisons across key constructs, supporting thoughtful interpretation of the organisation's FSC maturity. A small proportion of employees did not participate in the original survey questionnaire, which is typical in manufacturing environments and most likely due to shift work or unavailability during the data collection period. As a secondary data analysis, the research study relied on an existing survey questionnaire and therefore did not allow for further refinement or clarification of specific items. Although the focus on one organisation limits the generalisability of the findings, it ensured strong contextual relevance. Overall, the high participation rate, the comprehensive nature of the dataset, and the analytical clarity achieved through the quantitative assessment provide a sound and credible foundation for interpreting the organisation's FSC. These outcomes not only reinforce the validity of the quantitative findings but also create a foundation for understanding how the results translate into practice.

The findings provide a valuable framework for assessing the organisation's FSC, highlighting both established strengths and areas requiring strategic attention. Strengthening leadership commitment, ensuring open communication, consistent and accessible training, and integrating food safety principles into daily operations will be central to building a more mature and resilient

FSC. By addressing these areas, the organisation can enhance its internal culture and reinforce compliance with international food safety standards, promoting long-term success and consumer trust. Ultimately, maintaining a robust FSC is essential for ensuring product safety, protecting consumer health, and sustaining regulatory compliance, a continuous process that requires reflection, adaptation, and shared responsibility at every level of the organisation.

Table 4.1. Outlier constructs identified per question

Construct	Question	Question #	Mean score per question
Vision	Our company has effective leadership	2	63
	We are made aware of food safety through, for example, discussions, notices, signage, pamphlets, seminars, announcements and the like	10	69
Inspiration	I am part of food safety decision making	17	47
	My opinion is valued and respected	15	55
	My company cares about its people and make them a priority	19	55
Empowerment	Employees are not allowed to operate without having received adequate training	26	61
	Faulty, inadequate or old equipment is replaced and/or maintained regularly	30	66
Performance	We are recognised and acknowledged for exceptional food safety performance	39	53
	Outcomes of inspections and audits are transparent and shared with all staff	34	66
Change appetite	All employees enjoy the same opportunities and recognition	48	47
	I am informed about change plans and processes	43	54

Table 4.2. Example of maturity calculation per construct

n = 50; Questions = 5; Minimum grade/question: 0 (Weight) x 50 (Respondents) = 0; Maximum grade per question: 4 (Weight) x 50 (Respondents) = 200; Total weight per category = 4 (Weight) x 5 (Questions) x 50 (Respondents); Score/question = SUM weight per Likert category x number of respondents across all categories								
	Disagree					Agree		
WEIGHT	0	1	2	3	4	SUM Weight per Question ^b	Score per Question (%) ^c	Weighted Contribution (/Questions) ^d
I know and understand our food safety policies and goals	0	1	3	19	27	172	86	17.2
I know what is expected from me regarding food safety	0	1	1	16	32	179	89.5	17.9
I do not tolerate food safety lapses in my area	1	0	5	13	31	173	86.5	17.3
I have the knowledge and tools to do my work well	2	4	5	16	25	162	81	16.2
I have right food safety skills to do my job well	1	4	5	14	26	160	80	16
SUM ^a	4	10	19	78	141			MATURITY SCORE (%) ^f
SUM Weight (Total of responses x weight) ^e	0	10	38	234	564	846	846 per 1000 max	84.6%

a: Visualises the performance of the organisation on terms of the specified construct (e.g. Vision). Used in conjunction with Maturity Score

b,c: Used predominantly in graphs - indicates the scores of the individual questions relative to each other – also used to identify particular outliers

d: Indicates the scores in accordance with weighting – not used often

e: Also used to indicate performance of the organization in terms of the specified construct but mostly for Maturity Score calculation

f: Used to indicate the maturity and performance of constructs against one another at-a-glance (builds upon ^a if required)

Above calculations and results can be used randomly to assist in the explaining findings and drawing conclusions

Table 4.3. Example of a Food Safety Culture Maturity Model

CONSTRUCTS	VISION		INSPIRATION		EMPOWERMENT		PERFORMANCE		CHANGE APETITE AND IMPROVEMENT	
DIMENSIONS AND SCALES	The existence of clear direction and understanding of food safety goals, expectations and targets, encouraged by ethical, logical and compassionate leadership through effective communication and across all occupational levels		The confidence and participation of employees on all levels to engage in food safety, facilitated through actions that create a sense of loyalty, ownership, responsibility and confidence		The provision of, and access to adequate and relevant training and resource provision, including knowledge and skills, infrastructure, equipment, finances and staff to enable achievement of the organisation's food safety goals and expectations		Maintenance of responsive and consistent documented food safety management systems and procedures which includes relevant compliance and risk assessment instruments, monitoring, metrics, evaluation, consequences, achievements and improvement measures		Our organization's level of awareness, respect and equitability across portfolios relating to culture, race, gender and levels of authority; its agility and progressiveness to change and improve in response to emerging technological, economical, societal and organizational demands that may influence food safety performance	
	QN	QL	QN	QL	QN	QL	QN	QL	QN	QL
Sustaining Excellence	Maturity Level 5 Score 95% above		Maturity Level 5 Score 95% above		Maturity Level 5 Score 95% above		Maturity Level 5 Score 95% above		Maturity Level 5 Score 95% above	
	QN	QL	QN	QL	QN	QL	QN	QL	QN	QL

Pro-active and Preventative	Maturity Level 4 Score 86-95%		Maturity Level 4 Score 86-95%		Maturity Level 4 Score 86-95%		Maturity Level 4 Score 86-95%		Maturity Level 4 Score 86-95%	
	QN	QL	QN	QL	QN	QL	QN	QL	QN	QL
Safeguarding	Maturity Level 3 Score 71-85%		Maturity Level 3 Score 71-85%		Maturity Level 3 Score 71-85%		Maturity Level 3 Score 71-85%		Maturity Level 3 Score 71-85%	
	QN	QL	QN	QL	QN	QL	QN	QL	QN	QL
Aware and Responsive	Maturity Level 2 Score 51-70%		Maturity Level 2 Score 51-70%		Maturity Level 2 Score 51-70%		Maturity Level 2 Score 51-70%		Maturity Level 2 Score 51-70%	
	QN	QL	QN	QL	QN	QL	QN	QL	QN	QL
Reactive and Compliant	Maturity Level 1 Score up to 50%		Maturity Level 1 Score up to 50%		Maturity Level 1 Score up to 50%		Maturity Level 1 Score up to 50%		Maturity Level 1 Score up to 50%	
	QN	QL	QN	QL	QN	QL	QN	QL	QN	QL

MATURITY SCORE - QUANTITATIVE ASSESSMENT: ____ MATURITY SCORE - QUALITATIVE ASSESSMENT: ____ TOTAL AVG: ____

QN: Quantitative score; QL: Qualitative score

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CHAPTER 5:

Exploring Food Safety Culture at a South African Wet Condiment Manufacturer: A Qualitative Data Analysis

An original research article for submission partially or in full to *Foods* (Multidisciplinary Digital Publishing Institute [MDPI]; ISSN 2304-8158).

ABSTRACT

Introduction and Aim

Food safety culture (FSC) encompasses the values, beliefs, and behaviours that underpin an organisation's commitment to ensuring food safety. It is cultivated when individuals recognise their responsibility for producing safe food demonstrated through their daily actions and reinforced by continuous reflection on the values that guide these behaviours. The FSC movement recognises that adherence to regulations on its own cannot guarantee safe food production; instead, it is the attitudes and behaviours of individuals across the organisation that play a key role in preventing food safety incidents.

Assessing FSC offers valuable insight into an organisation's current cultural maturity, thereby informing the development of targeted strategies and interventions aimed at strengthening food safety practices. Although awareness and application of FSC principles have grown steadily, shown by their increasing inclusion in global regulations, private standards, and academic discourse, the research remains limited within the context of wet condiment manufacturing. Accordingly, this study aimed to investigate the barriers influencing FSC within a wet condiment manufacturing organisation and to propose a set of interventions that could serve as a foundation for standardisation, strategic decision-making, and future improvement initiatives.

Methodology

A secondary data analysis was undertaken using qualitative data from a consultative project carried out at a wet condiment manufacturing organisation in South Africa. The study received approval from the University of the Free State's General/Human Research Ethics Committee (UFS-HSD2024/1169). Written informed consent was obtained, and data was handled in accordance with Protection of Personal Information Act (POPIA). Participants' perspectives on FSC were explored through individual interviews, while focus groups facilitated discussions across departments and organisational levels. These were complemented by an observational assessment that provided insights into everyday practices and behaviours within the organisation. Patterns emerged concerning values, attitudes, and behaviours shaped by

communication, leadership, perceptions of food-related risks, recognition, resources, and team dynamics. To interpret these insights conceptually, a combination of content analysis, thematic analysis, grounded theory, and discourse analysis were employed.

Results

A total of thirteen participants (6.83% of the total workforce) participated in interviews. Twelve focus groups were conducted with ten participants each, comprising 120 unique employees. Each participant attended a single session. Stratified selection ensured representation across departments and organisational roles (63.2% of the total workforce). The interviews generated 225 individual responses, while the focus groups produced 121 responses. The discussions revealed concerns related to strategy, communication, risks, supervision, team dynamics, and training, alongside challenges regarding resources, equity, workload, and food safety artefacts. These themes were validated through observational assessments, which further underscored issues of operational flow, communication, and training.

Conclusion

The findings underscored the critical role of top-down communication, with variation in perspectives between leadership and employees illuminating the broader state of the organisation's FSC. By reframing these barriers into a targeted intervention strategy that confronts underlying causes, the organisation can cultivate a more engaged workforce and enhance its FSC.

Keywords: Secondary data analysis, qualitative research, food safety culture, communication, wet condiments, South Africa

5.1 BACKGROUND

Food safety remains a global health concern, reflected in the continued occurrence of foodborne illness outbreaks, making the safety of condiments equally important. According to the World Health Organization (WHO), approximately 600 million cases occur annually, resulting in around 420 000 deaths (WHO, 2015). Historically, food safety has been rooted in microbiology and public health, both in empirical analysis and regulatory frameworks (Griffith *et al.*, 2010a; da Cunha *et al.*, 2025; Frankish *et al.*, 2023). As the global movement of food across borders has expanded; including condiments, the disciplines of food hygiene, food science, microbiology, nutrition, food process engineering, and environmental health have become increasingly interconnected. Collectively, these areas form the foundation of food safety assurance and support the national and international standards that guide implementation, management, and compliance (Yiannas, 2009; Ferreira *et al.*, 2025).

The wet condiment industry faces specific challenges due to the diversity of its ingredients, the variability of shelf life, and the global sourcing of raw materials, making a strong FSC essential for safeguarding products within this sector (Hobbs, 2002; Dinh Thanh *et al.*, 2017; Zhang *et al.*, 2025). In developing contexts, however, scholarly attention to food safety within this industry continues to be underexplored. Condiments and spices hold a significant role in global food trade, shaping both exporting and importing economies, and are generally understood as mixtures of spices and flavour enhancers added after cooking (García-Casal *et al.*, 2016). While the literature offers differing definitions, condiments are most often described as flavour-enhancing products added after serving, drawing on spices or extracts to enhance flavour. Within this broad category, researchers distinguish between simple forms such as garlic or onion salt and more complex products like chilli sauce, chutney, mint sauce, or meat sauce, each signifying the diverse ways condiments contribute to food culture and consumption (Spence, 2018; Peter, 2012).

The FSC concept extends beyond compliance with established standards and regulations, centring on cultivating a mindset in which every individual acknowledges their responsibility for

producing safe food (GFSI, 2018). Earlier approaches to food safety management were largely regulatory, focusing on adherence to prescribed requirements (Nyarugwe *et al.*, 2016). Over time, however, it became evident that compliance alone was not enough. Studies have underscored that behaviour and attitude are equally pivotal in preventing food safety incidents (Griffith *et al.*, 2010a; Powell *et al.*, 2011; Wu & Wallace, 2025). The literature reflects varied terminology regarding FSC. One influential definition describes it as “a long-term construct existing at the organisational level, linking to the deeply rooted beliefs, behaviours and assumptions that are learned and shared by all employees which impact the food safety performance of the organisation” (Sharman *et al.*, 2020).

In this research study, culture is understood as the system of shared values, norms, and underlying assumptions that shape how food safety is prioritised and integrated within an organisation (Zanin *et al.*, 2022). In contrast, food safety climate refers to employees’ shared perceptions of food safety practices and priorities at a specific point in time. While climate may reflect how food safety is currently experienced, culture represents the more constant foundation that influences behaviour over time (Pai *et al.*, 2024). Additionally, food safety management systems (FSMS) introduce visible artefacts such as documented procedures, audit systems, training records, and signage. However, these artefacts only translate into meaningful risk control when employees internalise them consistently in daily practice. The interaction between formal systems and behaviour therefore becomes central to understanding FSC (da Cunha *et al.*, 2025). This distinction informs the methodological approach adopted in this research study, as qualitative methods enable exploration beyond documented compliance to examine how leadership, communication, and shared assumptions shape the practical implementation of food safety requirements.

Organisations with a strong FSC integrate food safety into their core values, integrating it into daily practice. When food safety is embedded within organisational culture, employees are more likely to adopt best practices, thereby reducing the risk of foodborne illness outbreaks

while mitigating financial and reputational harm (De Boeck *et al.*, 2017; Zanin *et al.*, 2021; Wiśniewska & Zamojska, 2015).

A range of factors shape FSC, including the influence of food safety management systems (FSMS), leadership style, accountability and commitment, and the quality of communication (Marconi *et al.*, 2023). Knowledge and training, the broader organisational environment, and perceptions of risk management also play an important role (de Andrade *et al.*, 2020). Globally, FSC has increasingly been recognised as a critical element of food safety assurance and is now incorporated into major standards (BRCS, 2018; Frankish *et al.*, 2021; FSSC 22000, 2023). The Global Food Safety Initiative's (GFSI) 2018 position paper marked a turning point in elevating FSC awareness, and since then, recognition of its role in risk prevention has continued to grow (GFSI, 2018). Yet, despite these developments, the practical implementation and measurement of FSC continue to present challenges, and there remains a pressing need for both industry insights and academic research to address these gaps (da Cunha *et al.*, 2025; Frankish *et al.*, 2021).

The pioneer of total quality management, W. Edwards Deming, stated, "A bad system will beat a good person every time" (English, 2012). Within the context of food safety, this idea demonstrates that organisational culture plays a significant role, reminding us that successful leaders are those who recognise that building and sustaining a strong FSC is central to long-term success (Frankish *et al.*, 2021; Jespersen *et al.*, 2016). Effective leaders therefore prioritise the development and maintenance of both robust FSMS and a proactive FSC (Pai *et al.*, 2024; da Cunha *et al.*, 2025). This leadership responsibility has since been formalised in international standards, which mandate top management to embed FSC into organisational strategies and practices. The FSSC 22000 guidance document, aligned with version 6 of the scheme and the benchmarking requirements of the GFSI, emphasises the importance of strengthening food safety and quality culture (FSSC 22000, 2023). In line with clause 5.1 of ISO 22000:2018, it mandates top management to define, implement, and maintain objectives that integrate FSC within the FSMS. This evolution exemplifies that food safety and quality culture is recognised as

a core element of organisational functioning rather than an optional or secondary concern. By underscoring the role of communication, training, employee engagement, feedback, and performance evaluation, the ISO 22000:2018 standard draws attention to the human and behavioural dimensions of food safety. These elements reinforce why qualitative approaches to research are particularly valuable when exploring cultural dynamics.

Table 5.1 summarises the latest version of the scheme (FSSC 22000 v6, part 2, section 2.5.8), which positions leadership, roles and responsibilities, training, and decision-making as central to shaping food safety and quality culture. Importantly, interviews are acknowledged as a critical tool for capturing these cultural dimensions in practice (FSSC 22000, 2023). This evolution marks a significant shift, showing that FSC must be embedded within the foundation of an organisation's FSMS rather than treated as an additional component (Pai *et al.*, 2024).

In FSC assessments, qualitative research methods are particularly valuable during the interpretive stage, as they enable deeper exploration of organisational dynamics such as leadership and culture. By drawing on qualitative data, researchers can reveal insights that inform more meaningful interventions and reinforce commitment to food safety. Qualitative methods document the nuances of phenomena such as employee behaviours, perceptions of food safety, and organisational culture through the identification of themes and categories, whereas quantitative approaches provide breadth. These methods also present challenges: they are time-consuming, demand extensive data management, and require rigorous analytical strategies such as thematic analysis (Zanin *et al.*, 2021; Lin & Roberts, 2020). One of the challenges lies in their reliance on self-reported data, which often necessitates complementary methods to enhance credibility and validity. Self-reported accounts can be influenced by bias; credibility is therefore improved when they are supplemented by observational assessments that capture real-time behaviours and interactions (Koller *et al.*, 2023; Patton, 2015). By recording non-verbal cues such as facial expressions, gestures, and body language, observational data enriches self-reported findings and provides a more holistic understanding of participants' emotions, attitudes, and social dynamics (Stefan, 2024; Denzin & Lincoln, 2018; Hargie, 2006).

Compared with quantitative methods, qualitative approaches enable the exploration of employee behaviours and contextual factors shaping FSC, thereby supporting the design of targeted interventions that address underlying challenges (Hussein, 2009; Lin & Roberts, 2020).

Interviews and focus groups are well-established qualitative methods, each offering distinct advantages for different research objectives. Interviews, in particular, facilitate in-depth exploration of individual experiences, capturing thoughts, feelings, and perspectives in ways that encourage openness, especially when addressing personal topics (Rubin & Rubin, 2012; King & Horrocks, 2010). The one-on-one format enables active engagement, offers flexibility for the researcher to adapt and probe further, and promotes more accurate responses that are less influenced by the presence of others (Kvale, 2007). However, interviews are often more time-consuming and costly than focus groups, and the smaller number of participants may limit the diversity of insights gathered (Bryman, 2016). In addition, integrating individual inputs into a broader cultural understanding, as well as the potential influence of the facilitator, can introduce bias (Jespersen & Wallace, 2017; Zanin *et al.*, 2021; Patton, 2015).

While interviews provide depth through individual engagement, focus groups offer a more cost-effective way of gathering insights from multiple participants simultaneously (Morral, 2024). The group setting enables participants to build on each other's ideas, revealing social and cultural dynamics that enrich discussion and enhance the validity of findings (Morgan, 1997; Krueger & Casey, 2015; Sharma *et al.*, 2023). They also enable the observation of non-verbal behaviours, providing valuable context to participants' verbal responses (Stewart & Shamdasani, 2014). However, focus groups may offer less depth than interviews, risk dominance by stronger voices, and present logistical challenges in their organisation (Sim, 1998; Krueger & Casey, 2015). The integration of observational assessments alongside interviews and focus groups facilitates a more comprehensive analysis by uncovering patterns and behaviours that participants may not consciously recognise or articulate during discussions (Spradley, 2016). This additional depth enables researchers to identify emerging themes and variables that enrich overall understanding. As Spradley (2016) noted, observational assessments can expose underlying

power dynamics, informal communication channels, and cultural norms, offering a more refined perspective than interviews or focus groups alone.

As with other research methods, the use of secondary data presents both advantages and limitations. Secondary data can provide valuable contributions to knowledge, inform policy and interventions, and guide future research. As the data already exists and is accessible, it can be applied to research questions beyond those of the original study (Pederson *et al.*, 2020). Advantages often associated with secondary data analysis include efficiency, convenience, and reduced cost, and its use has also been linked to ethical responsibility in research practice (Cheong *et al.*, 2023). Challenges, however, concern the suitability and quality of the data, as well as uncertainty surrounding its original collection. These limitations may be partially mitigated: while primary data may not always align perfectly with new research questions, adaptability allows researchers to bridge this gap, provided they establish that the original instruments were valid, reliable, and trustworthy, thereby safeguarding the integrity of analysis (Heaton, 2008).

The purpose of this secondary data analysis was to evaluate the existing FSC within a wet condiment manufacturing organisation. This chapter outlines the arrangements for conducting the research study and presents an analysis of the secondary data. Drawing on these findings, the research study aimed to identify both barriers and opportunities for strengthening the organisation's FSC.

Table 5.1. Summary of the FSSC 22000 Guidance Document (FSSC 22000, 2023)

Elements	Themes	Qualitative Method	Role(s)	ISO 22000:2018 Clause
Communication	Leadership, commitment	Observation	All employees	Clause 5.1, d
	Food safety policy	Observation	All employees	Clause 5.2.2, a and b
	Vision and mission	Observation	Top management	Clause 5.2.2, b
	Roles and responsibilities	Interview/observation	Shop floor	Clause 5.3.1
	Communication system	Interview/observation	Shop floor	Clause 7.4.3
	Food safety expectations, decision making	Interview	Top management, shop floor	Clause 4.2, Clause 6.2
	Response time	Observation	Top management	Clause 4.1, Clause 6.3, Clause 9.3
	Industry intelligence	Interview	Top management	Clause 4.1
Training	Food safety training frequency	Interview	Shop floor	Clause 7.2, b
	Individual contribution	Observation	FSMS	Clause 7.3

Employee feedback and engagement	Responsibility to report FSMS problems	Interview	Food safety leader, shop floor	Clause 5.3.3
	Individual contribution	Interview	Shop floor, observation	Clause 7.3, c
	Individual commitment	Interview	Shop floor, observation	Clause 7.1.2
	Documentation design	Observation	FSMS	Clause 7.5.1, b
	Engagement	Observation	Food safety team, top management	Clause 5.3.2
Performance measurement	Measurement	Interview, observation	Shop floor	Clause 9.1.2, Clause 9.3.2
	Change management	Interview	Top management	Clause 6.1.1
	Complaints and non-conformances	Observation	Top management	Clause 9.1.2, Clause 10.2
	Changes and improvement to FSMS	Observation	Top management	Clause 8.9.1, Clause 10.3

5.2 METHODOLOGY

This research study undertakes a secondary analysis of qualitative data generated during a consultative project at a wet condiment manufacturing organisation in South Africa. The dataset included interviews, focus groups, and an explanatory observational assessment in the form of a consolidated report, documenting perspectives from management, frontline and administrative employees to ensure comprehensive organisational representation. Drawing on these secondary datasets and supplementary documentation, the analysis assessed the maturity of the organisation's FSC and highlighted barriers limiting its development.

5.2.1 Research Design

Secondary data analysis involves the investigation of data originally collected by another researcher. It remains grounded in the same methodological principles as primary research and follows a framework comparable to established qualitative approaches (Johnston, 2014). Such analysis typically serves two main purposes: first, to investigate new or supplementary research questions, and second, to validate or extend the findings of earlier studies. In this research study, secondary datasets and supplementary documentation were re-analysed to generate new insights into the barriers shaping FSC.

5.2.1.1 Primary Data Collection

During the primary investigation, qualitative data were generated through interviews, focus groups, and an observational assessment. The one-on-one interviews and focus groups were guided by twenty open-ended questions covering constructs such as vision, empowerment, performance, and change appetite. The primary researcher documented field observations within a structured framework, providing a direct account of behaviours and operational routines. The observations were particularly useful for capturing non-verbal behaviours and everyday practices that might not have been voiced in interviews or focus groups (Saunders *et al.*, 2023). Combined with interview and focus group data, these observations enriched the qualitative insights on the organisation's FSC.

5.2.1.2 Secondary Data Analysis

The secondary researcher was granted access to all data and documentation compiled by the primary investigator, including anonymised materials, a consolidated report, and supplementary records. Access also extended to the raw interview and focus group datasets, enabling re-analysis and strengthening interpretation of FSC. Saunders *et al.* (2023) emphasise that secondary data may take the form of written records as well as multi-source information, both of which were used in this study. To respond to the interdisciplinary nature of FSC, a multi-method qualitative design was employed (De Vos *et al.*, 2012; Johnson & Onwuegbuzie, 2004). This approach offered a breadth and depth of insight that would not have been achievable through a single method alone (Lund, 2012). Additionally, the use of secondary data broadened the scope of inquiry, allowing for the examination of dimensions that may not have been captured in the original study (Cheong *et al.*, 2023). One limitation of this approach lies in the difficulty of generalising findings; however, rigour was enhanced through engagement with diverse datasets (Polit & Beck, 2010).

In this research study, the research design brought together interviews, focus groups, and an observational assessment, integrating these methods into a complementary set of perspectives on the organisation's FSC (Tashakkori & Teddlie, 2010; De Vos *et al.*, 2012). By triangulating these different datasets, the research study developed a coherent framework that addressed the research questions more comprehensively and holistically than any single method could achieve.

5.2.2 Research Methods and Data Collection Tools

The section below outlines how the data were originally collected and subsequently accessed for this research study. In the primary investigation, interviews and focus groups were guided by a set of twenty open-ended questions, contextually aligned with food safety constructs such as vision, inspiration, empowerment, performance, and change appetite. Participant selection combined purposive and convenience sampling to ensure both relevance and practical feasibility. The accompanying observational assessment centred on behaviours related to food

safety themes that had surfaced during the interviews and focus groups (Denscombe, 2017). Saunders *et al.* (2023) describe observational methods as particularly effective for capturing naturalistic behaviours and environmental cues that participants may not consciously articulate. In line with this, the observational assessment prioritised documented practices rather than subjective interpretation and intentionally excluded body language analysis to minimise potential researcher bias; which is an important consideration in secondary data analysis, where direct contextual engagement is inherently constrained (Cheong *et al.*, 2023).

For the purpose of this chapter, interview and focus group transcripts were thematically analysed to identify recurring patterns, while observational records provided complementary insights that enriched interpretation of FSC dynamics.

5.2.2.1 Interviews

One-on-one interviews were originally conducted to generate in-depth qualitative data, allowing for the documentation of nuanced perspectives that may not emerge in group settings. Interviews are particularly valuable for exploring underlying attitudes, values, and behaviours, while providing a private space in which personal topics can be discussed (Denscombe, 2017; Saunders *et al.*, 2023). In the primary investigation, open-ended questions encouraged participant-driven responses that extended beyond predefined categories. Ethical protocols were observed at the time of data collection: participants were informed of the study's purpose and assured of anonymity and confidentiality, consistent with best practice (Saunders *et al.*, 2023). Also, interviews are recognised within FSSC 22000 v6 as a suitable method for assessing qualitative indicators relevant to FSC (FSSC 22000, 2023). For the purposes of this secondary data analysis, these transcripts provided valuable insights into employees' lived experiences of food safety within the organisation.

5.2.2.2 Focus Groups

The primary aim of the focus group discussions was to explore participants' experiences, perceptions, and suggestions related to FSC within the organisation, while capitalising on group

interactions. This approach enabled the collection of department-specific insights by drawing on contributions from participants across areas such as human resources (HR), maintenance, finance, and quality, thereby broadening both scope and relevance (De Vos *et al.*, 2012). To encourage openness, discussions were complemented with opportunities for anonymous written feedback (Saunders *et al.*, 2023). Within this secondary analysis, the focus group datasets served as an interpretive lens, capturing perspectives from employees across both operational and administrative levels of the organisation.

5.2.2.3 Observational Assessment

An observational assessment is a structured and systematic process used to document events, behaviours, artefacts, individuals, settings, and routines within an organisation. As Marshall and Rossman (2019) and Cohen *et al.* (2017) emphasise, observation allows researchers to directly engage with relevant phenomena, often highlighting interactions that may not be evident through self-reported methods. In the original study, observational data were collected during a facility walkthrough using a checklist specifically developed for this purpose. This tool provided a structured framework that guided the facilitator's evaluation of the organisation's food safety practices and performance. It encompassed dimensions such as the effectiveness of FSMS, employee competence and training, and audit and compliance measures. Saunders *et al.* (2023) note that observational tools in organisational contexts are particularly valuable for verifying whether behaviours align with formal systems and documented protocols. For this research study, the observational report provided complementary insights, enriching the interview and focus group data.

5.2.3 Trustworthiness

Establishing the trustworthiness of a research study is critical to ensuring the accuracy, credibility, and integrity of its findings. In the original investigation, the trustworthiness of the interviews, focus groups, and observational assessment was confirmed and validated as data collection tools (Creswell & Poth, 2018). For this research study, trustworthiness was further reinforced by evaluating how these tools and procedures aligned with recognised criteria of

credibility, confirmability, transferability, reliability, and dependability (Onwuegbuzie & Combs, 2011; Noble & Smith, 2015).

Credibility and confirmability were addressed through the triangulation of methods, the active involvement of the primary researcher, peer debriefing via critical interviews, and member checking during data collection. Transferability was reinforced by comprehensive recordkeeping, a clear audit trail of decision-making, and consistent, transparent interpretation of data (Noble & Smith, 2015). Reliability was strengthened through the use of established data collection tools that guided probing strategies within the questionnaire, while triangulation further supported the overall dependability of findings. In line with current expectations for transparency in validation practices, this research study highlights how trustworthiness was promoted by aligning assessment frameworks with recognised standards, enabling comparative interpretation across sectors and linguistic groups. Purposeful refinement of data collection instruments through stakeholder engagement further enhanced construct reliability, while transparent reporting reinforced the credibility of outcomes.

5.2.4 Data Collection Setting

The data supporting this secondary research study were originally collected within the organisational setting of a South African wet condiment manufacturer, providing a practical, real-world context for observing organisational operations and employee behaviour. This organisational environment contributed to ecological validity, as Saunders *et al.* (2023) emphasise the value of conducting research in authentic settings where participants act naturally and data collection is embedded within routine workflows.

The majority of employees of the organisation are recruited from the surrounding local community. The workforce is predominantly Coloured (70%), followed by Black African (16%) and White (12%) populations. Afrikaans is the primary language spoken by 81% of the community, with isiXhosa and English spoken by 10% and 3%, respectively (Statistics South Africa, 2011). Educational challenges are also observable in the region, with a learner retention

rate of only 60.3%. These demographic and educational realities provide important insight into the socio-economic context in which the original study was situated, shaping the composition of the workforce whose perspectives and behaviours informed the dataset. Such socio-demographic and educational factors constitute a critical backdrop for interpreting both responses and behavioural observations. Saunders *et al.* (2023) argue that research settings should be contextualised to account for influences such as regional culture, language, and access to education, all of which affect how values are experienced and expressed by employees. The original data collection was undertaken with formal approval from the organisation and relevant stakeholders, ensuring ethical and organisational coherence. Importantly, these contextual influences also frame how FSC is operationalised in practice, influencing communication styles, interest in training, and patterns of compliance across the organisation.

5.2.5 Participant Selection Framework

The original sampling strategy applied purposive sampling to ensure both thematic relevance and departmental diversity. As Creswell and Plano Clark (2018) note, qualitative sampling frames are typically anchored in participant expertise, functional roles, and agreement with the research questions. With the support of the organisation's HR department, interviewees were intentionally selected to include managers and members of the food safety team, given their specialised knowledge and leadership experience. Focus group participants, in turn, were recruited to reflect demographic and operational diversity within the organisation (Cassim, 2021).

Purposive sampling enriched the dataset by documenting both harmonised and divergent experiences across hierarchical levels, a characteristic particularly valuable for examining layered organisational dynamics (Bouncken *et al.*, 2025). In the original study, this approach was applied to interviews and focus groups, targeting individuals whose expertise or roles were directly relevant to the research objectives. While purposive sampling can introduce an element of subjectivity, it is widely regarded as essential for accessing experience-driven perspectives that may otherwise remain hidden (Denscombe, 2017). Saunders *et al.* (2023) bring additional

attention to that purposive sampling yields enriching insights when inclusion criteria are clearly defined and saturation thresholds considered. In line with this, Guetterman *et al.* (2015) propose that careful integration of sampling across research components supports integration and meta-inference in mixed methods designs, particularly where participant diversity strengthens interpretive depth.

For the focus group discussions, purposive sampling was supplemented with convenience sampling. Participants were recruited not only for their relevance to the research objectives but also for their availability during scheduled timeframes. Although convenience sampling may limit neutrality, in this organisational setting it facilitated efficient data collection while accommodating operational constraints (Cassim, 2021). Saunders *et al.* (2023) note that convenience sampling is often a practical necessity in organisational research, where departmental cooperation, time pressures, and accessibility vary.

For the observational assessment, both purposive and convenience sampling were applied to evaluate themes that had emerged during the interviews and focus groups (Denscombe, 2017). The methodology was anchored in the systematic analysis of organisational data, with commentary on body language intentionally excluded to minimise subjectivity. The facility walkthrough was guided by a structured checklist, though additional observations beyond its scope were also documented to capture contextual detail. The organisation's HR department ensured that all participants were informed about the facilitator's role and the objectives of the walkthrough, and observational records were anonymised prior to analysis within this research study. The purpose of the observational assessment was to provide a real-world perspective on operations, practices, and organisational context in relation to FSC (Powell *et al.*, 2013; Zanin *et al.*, 2021). This sampling approach, implemented by the original researcher, ensured the inclusion of relevant, diverse, and knowledgeable participants across functional areas. For the purposes of this research study, the resulting dataset offered meaningful, context-specific insights that complemented the interview and focus group data.

5.2.6 Data Collection Tool

The dataset comprised interview notes, focus group records, and a consolidated report from a facility walkthrough conducted after the qualitative discussions. The interviews and focus groups were structured around a twenty-question questionnaire that assessed the organisation's food safety goals, perceived challenges, and potential preventative strategies. Adapted from literature-informed tools developed for consultative projects in South Africa, the questionnaire was refined through academic and industry input (Yiannas, 2009; Griffith *et al.*, 2010b; Jespersen *et al.*, 2016; Nyarugwe *et al.*, 2016) and further adjusted following feedback from interest groups at Michigan State University and the Central University of Technology, Free State.

All interviews and focus groups were conducted by the primary researcher, trained in qualitative research methods, with support from the organisation's HR department for communication and consent. Thirteen interviews were conducted with top and frontline managers (6.83% of employees). The study purposefully targeted managerial roles responsible for food safety oversight, making this number suitable to capture key organisational perspectives. While focus groups engaged 120 employees across departments (63.2% of employees). Detailed notes were taken during these sessions, with anonymity assured throughout. The observational assessment, conducted after the interviews and focus groups, was guided by a structured checklist but remained open to emergent findings. It yielded 48 thematic occurrences that provided real-time insights into facility practices, communication, and food safety artefacts, while validating patterns identified in the interviews and focus groups. All data were anonymised and made available by the primary researcher for the purposes of this secondary research study. Moreover, no new data were collected as part of this research study.

5.2.7 Data Analysis

An anonymised secondary dataset comprising notes from interviews and focus groups, together with an observational report, was analysed using a thematic content analysis approach (Saunders *et al.*, 2023; Cassim, 2021). The analysis combined deductive and inductive strategies.

An initial coding framework was developed deductively from the literature on FSC (Frankish *et al.*, 2023), leadership (Pai *et al.*, 2024), communication (GFSI, 2018), and FSMS (GFSI, 2018), after which additional themes emerging directly from participants' accounts were identified inductively and incorporated into the analytical structure (Saunders *et al.*, 2023). Coding and categorisation were undertaken in Microsoft Word, allowing recurring patterns and cross-cutting themes to be identified while preserving the contextual nuance of participants' responses (Morgan, 1997; Maguire & Delahunt, 2017; Braun & Clarke, 2006). The data were coded by identifying common themes and concepts through systematic analysis of responses and grouping them into selected categories (Saunders *et al.*, 2023). Thereafter, analysis proceeded through iterative code modification and theme development, following Braun and Clarke's (2006) reflexive thematic analysis approach. A structured codebook was developed and refined throughout the analytical process to support consistent application of codes across interviews, focus groups, and observational data. Detailed lists of themes and codes for the interviews, focus groups, and observations are available in Appendices D, E, and F.

Observational data were extracted from a consolidated report compiled by the primary researcher and were initially analysed independently before being aligned with the broader thematic framework developed through the interviews and focus groups. This enabled comparison across data sources and supported the identification of convergent and divergent patterns. While frequency counts were not applicable to the group-based observations, recurring themes were recorded to reflect their prominence across different settings (Saunders *et al.*, 2023). To support interpretation, descriptive techniques were combined with visual tools such as bubble charts, which helped illustrate connections across data sources. The analysis was conducted exclusively on pre-existing data shared by the primary researcher, ensuring that no additional data collection occurred in this research study. This approach enabled integration with existing literature while adding contextual depth to organisational behaviours and FSC (Yiannas, 2009; Griffith *et al.*, 2010b; Lin & Roberts, 2020; Nyarugwe & Jespersen, 2024).

5.3 RESULTS AND DISCUSSIONS

The analysis of the interviews, focus groups, and observational datasets emphasised recurring themes, expressed both directly in participant discussions and indirectly within the observational report. Collectively, the findings highlight areas of vulnerability alongside opportunities to reinforce and sustain a stronger FSC. The sections that follow present these themes and illustrate how they were reflected across the different data sources.

5.3.1 Interviews

The interview data, examined through thematic analysis, revealed recurring patterns that reflected both organisational strengths and underlying challenges. A list of the themes and codes identified from the interview data is provided in Appendix D. Employees consistently underscored their loyalty to the organisation and their commitment to producing safe products; however, their experiences also revealed persistent barriers. Participants described workload pressures and personal experiences that affected their capacity to engage fully, while also articulating concerns about the adequacy of training. Prominent themes included food safety commitment and team loyalty, but these were accompanied by difficulties linked to team dynamics, internal communication, and operational efficiency. Collectively, these issues shaped the organisational context in which concerns were voiced, reflecting both the pride employees took in their work and the structural barriers they encountered. Notably, the analysis highlighted a tension between employees' articulated loyalty to food safety and the frustrations arising from communication gaps, limited accountability, and operational constraints; factors that ultimately undermined organisational effectiveness (Jespersen & Wallace, 2017).

Figure 5.1 presents the identified themes, labelled sequentially with alphabetical markers. For example, "A" represents communication, "B" denotes responsibility and accountability, and "C" captures operational flow and food safety risk. These labels are used for categorisation and do not indicate numerical ranking. The themes are plotted along the x-axis to distinguish them, while the y-axis reflects either frequency or perceived significance. Themes that appeared more

prominently in the data are therefore positioned higher on the graph, illustrating their relative dominance within the analysis.

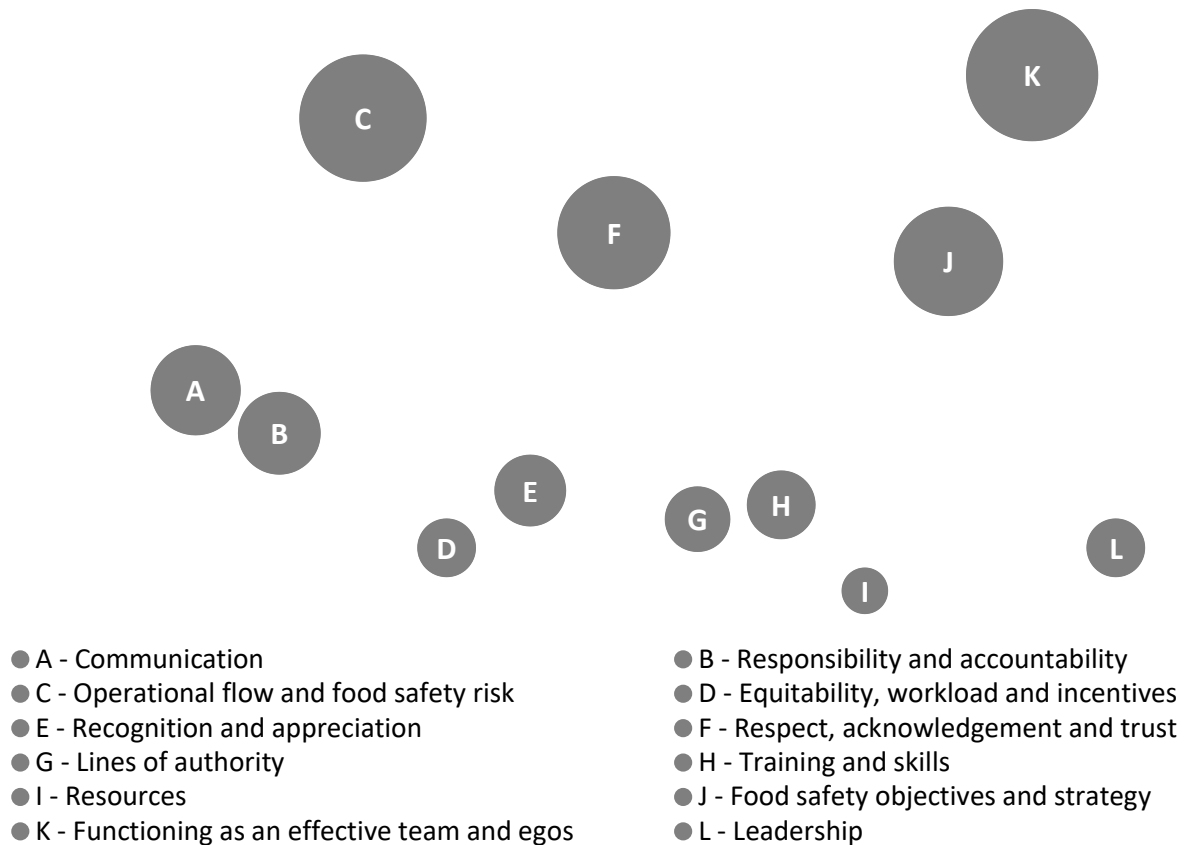


Figure 5.1. Synopsis of themed responses from the interviews

Figure 5.1 illustrates the distribution of interview responses, providing a visual representation of how participants emphasised different themes. The graph reflects the relative importance attributed to each theme, based on the frequency and weight of feedback shared during the interviews. The themes are plotted along the x-axis and frequency of mention on the y-axis.

Functioning as an Effective Team or Egos

The findings revealed concerns regarding team dynamics and the influence of strong personalities. As shown in Figure 5.1, “functioning as an effective team or egos”, labelled as “K”, emerged as a dominant theme with 41 responses (18%). Several participants expressed doubts

about the effectiveness of the management team, particularly in relation to cohesion and collaboration. Prior research by Ungku Zainal Abidin *et al.* (2014) identified teamwork as a critical factor influencing food safety practices. One participant observed that *"...certain individuals identified during the radical collaboration training"* continued to present challenges, pointing to unresolved interpersonal issues despite earlier interventions. Others reported ongoing conflicts at the managerial level, referring to them as *"...testosterone wars"*, an expression used to characterise confrontations that acted as barriers to teamwork and decision-making (Zanin *et al.*, 2021; Nyarugwe *et al.*, 2020; Taha *et al.*, 2024). Strengthening teamwork remains central to food safety leadership, encompassing the recognition and management of risks, responsiveness to feedback, and the ability to drive improvement across operational areas (Taylor *et al.*, 2015; Seward *et al.*, 2012; Taha *et al.*, 2024).

While some participants acknowledged the team's passion, many highlighted a *"resistance to compromise"* that delayed significant progress. This tension suggests that although motivation was present, the absence of collaboration delayed effective outcomes, while undermining behaviour emerged as a recurring theme. Conflicts were described as being marked by raised voices and derogatory remarks, such as *"...what a stupid idea"* voiced during meetings. Efforts to clarify problems were frequently perceived as blame-shifting, which further compromised trust. These dynamics reinforced a sense of divide, with repeated references to an *"us vs. them"* culture and statements like *"...I ask for help when I need it, and that's not often"*. Conflict not only delayed decision-making but also maintained perceptions of ongoing internal power struggles, as one participant explained, *"...we take too long to make decisions"*.

Collectively, these findings point to ongoing challenges in organisational processes, including weak collaboration, decision-making bottlenecks, and a pressured working environment. Such factors compromise teamwork and, more generally, undermine FSC by reducing opportunities for shared responsibility and collective problem-solving.

Operational Flow and Food Safety Risks

The theme of operational flow and food safety risks, labelled “C” in Figure 5.1, surfaced as the second most prominent theme, with 38 responses (17%). Participants frequently mentioned unplanned changes to the production schedule, limited communication regarding these adjustments, and a lack of accountability in managing their impacts. Several reported that such disruptions often compromised cleaning routines and weakened operational practices. As one participant explained, production pressure at times overshadowed essential procedures: “...when we need to stop a line, we can’t do this as we are behind on orders” (Frankish *et al.*, 2023). This observation resonates with broader evidence suggesting that financial and production pressures frequently shape manufacturing decisions, often at the expense of food safety (Ungku Zainal Abidin *et al.*, 2014; Powell *et al.*, 2011).

Furthermore, workload pressures were also repeatedly identified as a risk to food safety. One participant described the impact of time constraints on manual processes: “...manual processes – if we are in a hurry, we take chances”. Another reflected on maintenance practices, noting that inspections had become “...very superficial” checks, with implications for both equipment reliability and food safety (Frankish *et al.*, 2021). Concerns about ageing and unreliable equipment were frequently raised, with comments such as “...very very old equipment on the processing side” and “...number 1 problematic machine is that specific filler” underscoring risks to reliability and safety. Criticism was further directed at the organisation’s reactive approach to maintenance. As one participant remarked, “...Listeria in the floor – engineering standards are non-existent, it’s always a quick fix approach”, highlighting the absence of preventive strategies. Collectively, these insights point to the need for more robust operational planning, clearer communication channels, and a cultural shift toward proactive maintenance and food safety management (Manning, 2017; Crew, 2017). These pressures illustrate how operational priorities and resource limitations become integrated in organisational behaviour, cultivating a culture where short-term productivity is prioritised over long-term resilience. Such mindsets not only weaken technical safety measures but also signal to employees that food safety may be

compromised under pressure, ultimately limiting the development of a strong and sustainable FSC.

Respect, Acknowledgement and Trust

A total of 30 responses (13%) were linked to the theme of respect, acknowledgment, and trust, labelled “F” in Figure 5.1. Participants articulated openly how respect was often absent in organisational communication, describing situations where conflicts escalated into raised voices or derogatory remarks. Comments such as “...*raising of volume during conflict*” and “...*what a stupid idea during meetings*” demonstrate the kinds of interpersonal tensions that surfaced. These findings suggest more than isolated disagreements; they point to a breakdown in professional communication and to an organisational culture resistant to respectful engagement (Frankish *et al.*, 2023). One participant reflected on this personally, noting that they felt “...*disrespected like that*”, underscoring the emotional weight these interactions carried. This finding contrasts with Zohar and Tenne-Gazit’s (2008) observation that employees thrive when their contributions are welcomed. Instead, participants described respect as conditional, observing that organisational behaviour often deteriorated in the absence of senior managers: “...*when the big bosses are away, it’s chaos*”. Such comments highlight a reliance on authority figures to uphold respectful engagement, revealing a systemic weakness in which professional conduct is inconsistently enforced (Arendt *et al.*, 2015).

A recurring theme was a sense of distrust between departments. Statements such as “...*I ask for help when I need it and that’s not often*” reflected a reluctance to seek support from other teams, suggesting limited confidence in their knowledge or expertise. This lack of trust also manifested in reporting practices. Several participants noted that some employees bypassed their line managers to approach the general manager directly. For many, this behaviour was not about convenience but about a lack of confidence in the existing hierarchy, signalling that established leadership channels were no longer perceived as reliable (Ball *et al.*, 2010; De Boeck *et al.*, 2015). As Schein (2004) emphasises, once an organisation identifies its prevailing FSC, it must actively strengthen it through trust and consistency. Cultivating such an environment can

positively shape behaviour, as employees are more likely to feel respected, valued, and engaged (Taylor, 2015). Within this particular setting, however, the findings showed an organisation where respect and trust were inconsistently expressed, undermining the foundations of FSC and reducing opportunities for shared responsibility and collaboration.

Food Safety Objectives and Strategy

Participant comments revealed uncertainty regarding the governance of food safety objectives and strategies within the organisation. A total of 28 responses (12%) were associated with the theme “food safety objectives and strategy”, labelled as “J”. Many participants identified the absence of clearly defined and consistently communicated objectives as a critical concern, noting that this ambiguity generated uncertainty and inconsistency in daily practices. One participant captured the tension between vision and action, remarking, “...*Food safety is a shared vision, but it's not a shared mission. Everyone wants to be on the right side of history, but no one wants to make the sacrifice*”. This suggests that while overarching goals are acknowledged, genuine commitment to action and accountability remains weak. Such gaps reflect broader concerns about the organisation’s FSC, where stated goals are not consistently translated into everyday practice (Zanin *et al.*, 2021; Nyarugwe *et al.*, 2020).

Another participant connected this issue to performance incentives, stating, “...*no one thinks of measurable objectives... no link to incentives*”. The findings indicate that without measurable objectives or clear accountability, food safety risks are often deprioritised (Thorsen *et al.*, 2025). Participants also highlighted weak alignment between the organisation’s food safety strategy and its broader goals, observing that limited cross-departmental collaboration fostered defensiveness and blame (Reason *et al.*, 2001). These reflections underscore the importance of shared ownership, where responsibility for food safety extends across departments rather than being confined to specific roles (Seward *et al.*, 2012). In this research study’s context, however, the lack of measurable objectives, accountability mechanisms, and collaboration constrained the organisation’s ability to embed food safety into its strategic and operational structure.

5.3.1.1 Emergent Themes from the Interviews

Communication emerged as a central concern, with participants emphasising areas for improvement in both top-down and cross-departmental interactions. Statements such as "...silos" and "...passage conversations" captured the fragmented and informal nature of information flow. Alongside this, several participants identified a lack of responsibility and accountability, which they perceived as limiting the development of a strong FSC (Arendt *et al.*, 2015; Asghar, 2024). While underperformance was often met with consequences, consistent effort and hard work were frequently overlooked. This inconsistency appeared to weaken morale, given that recognition is generally regarded as a key driver of motivation (Griffith *et al.*, 2017). In contrast, a culture that consistently rewards positive contributions while addressing non-compliance fosters trust and reinforces the organisation's broader mission (Yiannas, 2009).

In addition, concerns were expressed about training practices. Food safety materials were provided exclusively in English, creating challenges for Afrikaans-speaking employees. Such language barriers risk constraining knowledge transfer and may negatively influence organisational culture (Hofhuis *et al.*, 2016). Additional, though less frequently mentioned, concerns included interpersonal conflicts and resource limitations, both viewed as factors that could compromise food safety practices and disrupt production efficiency. Although not as dominant as other themes, these findings illustrate the interconnected nature of organisational challenges, showing how culture, communication, training, and resources collectively shape the maturity of FSC (Pai *et al.*, 2024; Mortimore & Wallace, 2013; Alrobaish *et al.*, 2022).

5.3.2 Focus Groups

The findings revealed several themes shaping responses across departments. Most central were the behaviour and conduct of management and supervisors, the quality of communication, and the extent to which employees felt recognised and valued. Additional influences included perceptions of fairness and equity, past experiences and interdepartmental comparisons, structures of the organisational environment, and access to training and career opportunities. Collectively, these factors emerged as the primary drivers behind how participants framed their

responses. A list of the themes and codes identified from the focus group data is provided in Appendix E.

When analysed across departments, both shared concerns and context-specific differences became evident. Communication challenges surfaced as the most frequently reported issue. Participants described unclear instructions, limited feedback, weak information flow, and a lack of transparency as persistent barriers. Concerns about supervision and management were also widespread, with employees noting condescending behaviour, limited support, perceived favouritism, and disengagement from certain managers and supervisors. A recurring theme was the lack of recognition and appreciation, with many participants expressing a need for their contributions to be valued. Perceptions of unfairness further emerged, particularly in relation to workload distribution and perceived unfair treatment. Collectively, these findings underscore the importance of fostering a culture of mutual respect; both from leadership and among peers, as a foundation for organisational cohesion and the development of a more resilient FSC.

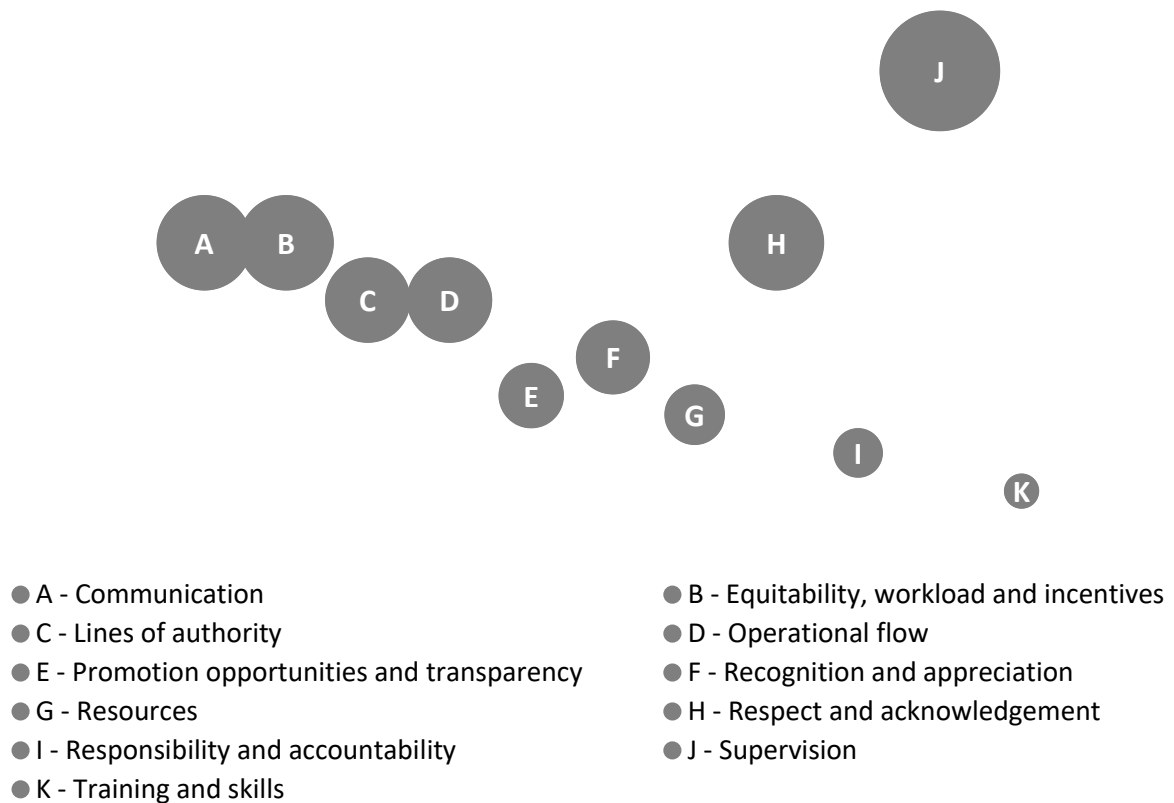


Figure 5.2. Synopsis of themed responses from focus groups

Figure 5.2 presents the themes identified during the focus groups, drawing attention to the key factors' participants perceived as shaping FSC. The data highlight not only the perceived importance of these themes but also their relevance to employees' everyday experiences and practices. The themes are plotted along the x-axis and frequency of mention on the y-axis.

Supervision

Supervision, labelled as "J" in Figure 5.2, emerged as a dominant theme with 24 responses (20%). Participants expressed concerns about supervisors' conduct, describing behaviours that ranged from disregard for employees to displays of self-importance. Several noted that the organisational climate discouraged them from voicing opinions, reinforcing a sense of distance between supervisors and their teams. Across departments, the findings pointed to widespread dissatisfaction with both the behaviour and overall effectiveness of supervisory employees.

These concerns clustered into four key areas: communication, behaviour, competence, and perceived favouritism. Of these, ineffective communication appeared most frequently, with participants linking poor supervisory communication to misunderstandings, reduced morale, and limited engagement.

Statements and comments from the focus groups:

"...Supervisors give different instructions"

"...Supervisors – poor communication – do not engage or ask advice from workers"

"...Supervisors don't communicate – not even greet"

These shortcomings not only created confusion and inefficiency but also left employees feeling overlooked. Such patterns demonstrate how supervisory practices directly influence organisational climate, with negative behaviours such as favouritism or lack of competence compounding the effects of poor communication.

Statements and comments from the focus groups included:

"...People are not treated equally to incentives and pay"

"...Race and gender play a role on the above"

These experiences undermined morale and, in some cases, led participants to consider leaving the organisation, illustrating the tangible impact of supervisory quality on retention and productivity. Some discussions suggested that productivity even improved in the absence of certain individuals, with one participant commenting, *"...if the particular PM is absent – production actually increases – much better work environment"*. These insights underscore the essential role supervisors play in shaping organisational conditions and influencing employee outcomes (Wilcock *et al.*, 2011).

While many comments reflected negative experiences, others indicated that not all supervisory interactions were problematic. Certain supervisors were described as approachable and supportive, showing that positive examples exist. This contrast reinforces the pivotal influence supervisors have on organisational climate and productivity (Pai *et al.*, 2024; Nayak & Waterson, 2017). Where supervisors demonstrated accessibility and fairness, employees felt more supported, suggesting that enhancing supervisory practices is both achievable and necessary. The literature supports these reflections, noting that supervisors are often underprepared for managerial responsibilities, as industry priorities tend to emphasise technical compliance over the development of leadership skills (Wilcock *et al.*, 2011; Griffith, 2014). Addressing these gaps through targeted leadership development at the supervisory level has the potential to strengthen FSC while improving employee morale. Although supervisory behaviour highlighted challenges at the individual level, the broader reflections pointed to communication as a systemic issue; shaping interactions not only between supervisors and employees but also across departments.

Communication

Communication, labelled as “A” in Figure 5.2, surfaced as a recurring theme with 15 responses (13%). Participants voiced concerns about unclear responsibilities, limited cross-departmental exchanges, and a perceived need for greater transparency. These reflections illustrate that communication gaps were not isolated incidents but part of a broader organisational pattern. Prior research highlights openness, consistency, respect, and feedback as essential elements of communication that directly influence safe food handling practices (Marconi *et al.*, 2023). Spagnoli *et al.* (2025) further argue that ineffective food safety communication often signals the presence of a reactive or negative FSC.

General statements and comments from participants included:

"...Communication NB"

"...Communication NB – especially amongst sections impacting Finance should improve"

Different to the interpersonal challenges linked to supervision, communication was described as a system-wide issue. Participants pointed to gaps in transparency, feedback, and information-sharing across departments, which they felt undermined both trust and efficiency.

Statement and comments related to communication concerns included:

"...Supervisors give different instructions"

"...Instructions similar to pre-batch and receiving"

"...When complains to supervisors or suggestion box – no feedback or response"

"...Staff should be made aware of positions advertised – have first right"

"...Communicate change in plans"

These findings demonstrate that breakdowns in communication affected not only the completion of tasks but also employees' sense of engagement, fairness, and inclusion in organisational processes. Despite these concerns, some participants offered positive examples of practices that fostered trust and collaboration. These included references to senior management's open-door policy and accessibility, which contrasted with departmental-level breakdowns:

"...Leadership is effective with an open-door policy"

"...Management is always ready to help and accessible"

"...Good organizational culture"

The findings indicate that while frameworks for transparency and engagement do exist within the organisation, they are inconsistently applied. When senior management models openness and fairness, they establish cultural expectations that reinforce stronger communication across departments (Griffith *et al.*, 2010a; De Boeck *et al.*, 2017). Integrating these practices more systematically could reduce inconsistency and strengthen FSC. In contrast to supervision, which often reflects interpersonal conduct, communication functions as an organisational framework. Literature underscores that openness, feedback, and trust are core elements of this framework

and vital to embedding FSC (Herscovitch & Meyer, 2002; Zanin *et al.*, 2021; Ungku Zainal Abidin *et al.*, 2014). Ensuring consistent and transparent channels for updates, instructions, and feedback remains an organisational priority to enhance morale and reinforce FSC (FSSC 22000, 2023).

Equitability, Workload and Incentives

The theme of equitability, workload, and incentives, labelled as “B” in Figure 5.2, included 15 responses (12%) and centred on concerns about perceived inequality in workload distribution, bias, and compensation. These concerns were raised across departments, pointing to systemic challenges that may affect both morale and productivity. Responses indicated inconsistencies in how employees were acknowledged and rewarded for their work, contributing to a sense of unfairness (De Boeck *et al.*, 2017). Literature supports this connection, with da Cunha *et al.* (2025) and Frankish *et al.* (2023) emphasising that recognising positive behaviour can strengthen morale and drive improvements in food safety performance. Concerns about equality and incentives emerged strongly in one group discussion, where participants described disparities in remuneration and rewards. One participant remarked that “...people are not treated equally to incentives and pay/race and gender play a role on the above”. Such reflections suggest that recognition and compensation were not always perceived as fair, and that demographic bias was viewed as a contributing factor.

Participant statements included:

“...Some inequality wrt [sic] recognition and remuneration”

“...Equitable treatment of all”

Further concerns highlighted unequal shift allocations and recurring perceptions of favouritism, with some noting that close relationships among employees created barriers to open communication. Financial discrepancies were also raised, particularly around salaries and remuneration, with anonymous notes calling for “...more fairness” and “...more equitability”. Workload distribution was another point of frustration, with some employees reporting that

they were overburdened while others carried lighter duties. Added unhappiness emerged when employees were required to assume responsibility for peers' mistakes, further reinforcing a sense of unfairness (De Boeck *et al.*, 2017). Incentives were also identified as problematic, with participants commenting that extra efforts, such as assisting other lines or departments, were not consistently recognised. Collectively, these issues point to weakened morale and job satisfaction, with potential consequences for team cohesion and operational efficiency (Ferreira *et al.*, 2025).

Alongside these concerns, some participants shared more positive reflections on organisational culture. Comments such as *"...organizational culture is fair"* and *"good organizational culture"* suggested that, for certain employees, fairness and equitability were experienced more positively. These statements were broad rather than tied to specific practices and may not reflect the views of all employees (Olsen *et al.*, 2023). Nonetheless, they demonstrate that more constructive practices are possible and provide useful benchmarks in efforts to strengthen equitability and cultivate a more motivated, engaged, and productive workforce.

Respect and Acknowledgement

There were 15 responses (12%) linked to the theme of respect and acknowledgement, labelled "H" in Figure 5.2. Participants consistently reported feeling unappreciated or undermined, which they believed diminished morale, engagement, and overall workplace satisfaction. Comments such as *"...sacrifices and commitment beyond core function not acknowledged"* and *"...no recognition for extra effort and initiative"* indicated that contributions extending beyond daily responsibilities often went unnoticed. The recurring remark *"...not acknowledged for hard work"* captured this broader sentiment. When employees perceive a lack of appreciation, morale and job satisfaction are likely to decline (Laschinger *et al.*, 2014). Concerns about respect were equally evident. Statements such as *"...staff opinions not valued"* and *"...respect is absent – lots of down-talk"* revealed that participants felt their voices were overlooked. Anonymous notes calling for *"...more respect"* together with comments like *"...opinion doesn't count"* reinforced this perception of reduced value. Additional reflections, including *"...old days were better"* and

"...friendly feedback from supervisor on how to improve", suggested that employees longed for conditions where communication and feedback felt more constructive. Collectively, these findings suggest that many employees felt disregarded, highlighting the need to strengthen acknowledgement and respect across the organisation. Without this, a culture of fear may develop, discouraging employees from raising concerns or sharing ideas (Wilcock *et al.*, 2011).

Positive examples, however, pointed to an encouraging leadership environment where values of communication and respect were demonstrated through accessibility and openness. Descriptions of leadership as "...ethical, able, and approachable" reflected acknowledgement of senior management's integrity and commitment. These insights show that respect and recognition are possible and, when evident, can positively shape employee perceptions. Building on this, structures that promote recognition, respectful communication, celebration of successes, and leadership training could further strengthen both organisational culture and FSC. By cultivating a culture grounded in respect and acknowledgement, the organisation may enhance morale, engagement, and overall well-being, while reinforcing the foundations of a resilient FSC (Peterson, 2017; Sharman *et al.*, 2020).

5.3.2.1 Emergent Themes from the Focus Groups

Less frequently raised concerns related to resources, lines of authority, operational flow, recognition, and promotion opportunities. Participants reported resource limitations, delegation of authority, and the need for stronger interdepartmental management, while others observed a lack of recognition for effort and limited opportunities for career development. Although not as prominent as supervision, communication, or fairness, these themes contributed valuable context, reinforcing the broader challenges already identified. The focus group discussions added depth by capturing everyday experiences and perceptions that may not have surfaced through other qualitative methods (Cassim, 2021). They revealed how organisational practices were lived and interpreted by employees, offering specific examples that translated into actionable feedback. Viewed collectively, the themes emphasise the

importance of addressing systemic concerns in order to reduce barriers, strengthen engagement, and support the development of a more resilient FSC.

5.3.3 Observational Assessment

The observational assessment supported themes identified in the interviews and focus groups while adding a distinct operational perspective. Consistent with the literature, observations offered complementary insights by capturing practices and conditions that may not be fully disclosed through discussion-based methods (Creswell & Poth, 2018; Merriam & Tisdell, 2016). The assessment highlighted practical challenges in daily operations, including organisational conditions, resource limitations, and barriers linked to communication and training; all of which carry consequences for the organisation's FSC (Zanin *et al.*, 2021). A summary of the themes and codes identified from the observational data is presented in Appendix F. These findings reinforce the value of observational approaches in identifying gaps between documented procedures and implemented practices (De Boeck *et al.*, 2017; Cassim, 2021), thereby contributing to a deeper understanding of cultural maturity and operational resilience.

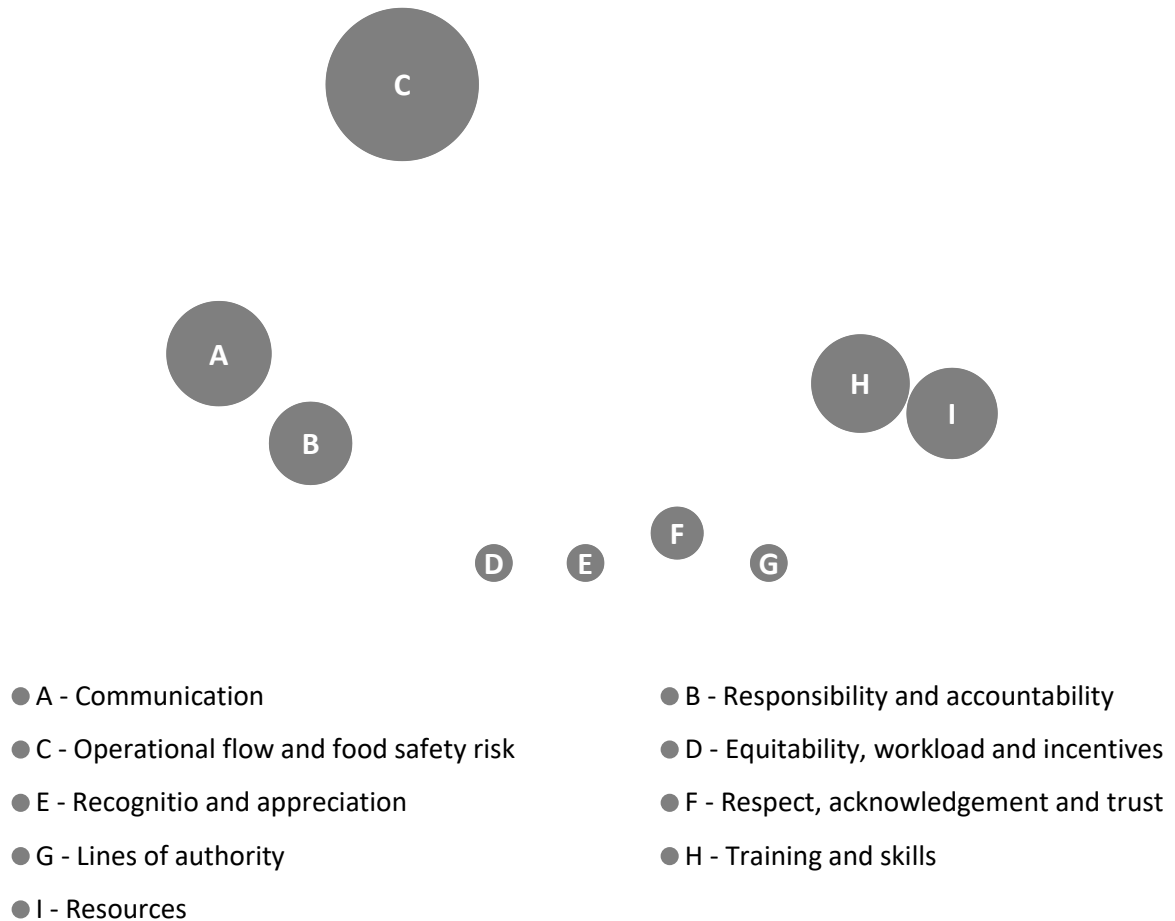


Figure 5.3. Synopsis of themed responses from the observational assessment

Figure 5.3 presents the themes identified through the observational assessment. The data were drawn from the consolidated report documenting the facility walkthrough conducted by the primary investigator. The themes are plotted along the x-axis and frequency of mention on the y-axis.

Operational Flow and Food Safety Risk

Operational flow and food safety risk (C) surfaced as the primary theme, with 17 observations (35.4%) highlighting tangible hazards and operational challenges (Figure 5.3). These included microbiological, physical, chemical, and allergen risks, with the retailer audit report further emphasising shortcomings in physical hazard controls. Observations were recorded across multiple areas of the facility, including the entrance, production floor, and warehouse. The

frequency of these findings underscores the need for targeted food safety interventions (Powell *et al.*, 2013; Zanin *et al.*, 2021). Importantly, when such risks become visible in daily operations, they influence not only product integrity but also how employees perceive and engage with the organisation's FSC (Nayak & Waterson, 2017).

Communication

Communication (A) was identified as a central theme, with 8 observations (16.7%). A recurring concern related to language barriers, as all documentation was provided exclusively in English, limiting accessibility and understanding of food safety procedures for predominantly Afrikaans-speaking employees (Hofhuis *et al.*, 2016). The assessment also noted a need for improved visual communication, including better use of shapes and colours, and highlighted the limited presence of visual artefacts reinforcing food safety messages. These gaps suggest that existing communication methods may be insufficient (da Cunha *et al.*, 2025; Olsen *et al.*, 2023). Positive practices were nevertheless observed, such as the colour coding of cleaning equipment and hairnets, which reflects good practice and forms an important element of effective FSMS (Olsen *et al.*, 2023; Malavi *et al.*, 2021). Collectively, these findings illustrate how the design of communication tools; whether linguistic or visual, can shape daily practices and directly influence how FSC is implemented on the production floor.

Training and Skills

An additional theme was training and skills (H), with 7 observations (14.6%). Concerns focused on the effectiveness of training, the suitability of training materials, and the reliance on English-only material, all of which indicated a need for improvement. Limited understanding of food safety concepts; particularly those related to microorganisms, contributed to a disconnect between employees and the motivation for Good Manufacturing (GMP) training, weakening the overall impact (Seward *et al.*, 2012; Maiberger & Sunmola, 2023). As Zanin *et al.* (2021) note, training influences not only technical competence but also the depth of food safety knowledge, which is essential to integrating cultural norms that support consistent and informed practice.

5.3.3.1 Emergent Themes from the Observational Assessment

Less prevalent observations included resources (6 observations, 12.5%); responsibility and accountability (5 observations, 10.4%); respect, acknowledgement, or trust (2 observations, 4.2%). Resource constraints and maintenance issues were visible, with faulty equipment not only disrupting operations but also raising contamination risks (Griffith *et al.*, 2010a; Zanin *et al.*, 2022; Alrobaish *et al.*, 2022). Questions of accountability also surfaced, with unclear processes for addressing concerns and reactive responses to non-conformance suggesting systemic weaknesses in management. The theme of food safety objectives or strategy indicated a fragmented approach, with few measurable objectives for implementation or monitoring (King, 2023). While respect and acknowledgement were rarely observed, the findings suggest that symbolic artefacts or reinforcement processes could help signify and strengthen organisational values (Ferreira *et al.*, 2025; Perry & Sanderson, 1998). Other themes; including equitability, workload and incentives, recognition and consequences, lines of authority, teamwork, and leadership, were less frequently observed but remain relevant. Though minor in occurrence, they provide useful context and point to areas requiring attention before small underlying factors intensify into broader challenges.

Overall, the observational assessment contributed a valuable operational perspective on food safety management (Zanin *et al.*, 2021). When considered alongside the interviews and focus groups, the observations extend the analysis by grounding cultural themes in daily practices, offering a more holistic understanding of FSC (Hussein, 2009; Zanin *et al.*, 2021).

5.3.4 Barriers to Food Safety Culture: Insights from Focus Groups, Interviews, and Observations

This section brings the qualitative findings together to provide a complementary view of the barriers shaping FSC. Some themes emerged prominently in the interviews and focus groups but were less visible or even absent in the observational data. This contrast reflects the apparent strengths of each method: while interviews and focus groups show how individuals perceive and experience their work, observations offer an immediate perspective on practices and conditions as they unfold. Despite these differences, several shared themes were identified (Figure 5.4),

representing both inter- and intra-categorical integration. These recurring elements not only highlight common challenges but also provide a foundation for shaping future interventions aimed at strengthening organisational culture and building a more resilient FSC.

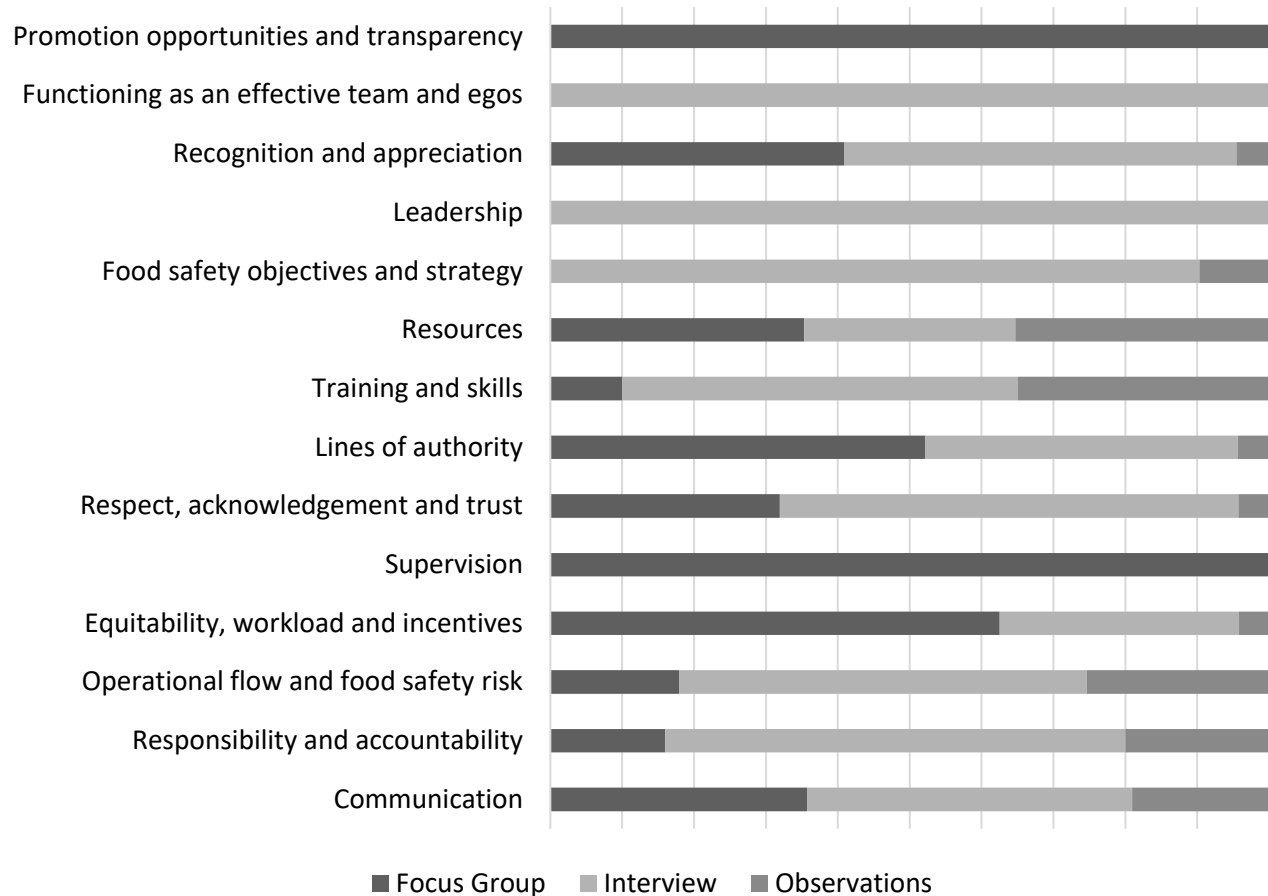


Figure 5.4. Consolidated thematic analysis of participant responses across interviews, focus groups, and observational assessment

Operational Flow and Food Safety Risks

Operational flow and food safety risks emerged as a recurring concern across all three qualitative methods. The prominence of this theme in the interview data suggests that participants found the format particularly favourable for raising operational challenges, while in focus groups the issue was less broadly discussed. This contrast demonstrates how methodological context shapes the expression of concerns, yet it also reinforces that workflow inconsistencies remain a persistent barrier to effective FSC. These divides risk integrating

workarounds and inconsistencies into daily routines, gradually normalising practices that weaken food safety performance (Lin & Roberts, 2020).

Respect, Acknowledgement and Trust

This theme was raised during interviews but appeared less notably in focus groups and was mostly absent from the observational data. Such variation suggests that while participants recognised the importance of respect and trust, these concerns were less visible in group settings or in day-to-day practices. Building trust and respect is nevertheless critical for fostering collaboration and embedding a sustainable FSC (Ferreira *et al.*, 2025). Concerns were echoed in limited role clarity and hesitancy around shared decision-making, both of which pointed to constraints in cross-departmental collaboration. Although different from concerns of equitability and recognition, the absence of trust and respect at a systemic level shaped similar consequence: reduced engagement, weaker teamwork, and an organisational climate that ultimately restricted the development of a resilient FSC (Frankish *et al.*, 2023).

Communication

While the importance of communication was broadly acknowledged, its execution appeared inconsistent in practice. As Gibbs (1961) noted, supportive communication reduces interpersonal conflict and strengthens team dynamics. The importance placed on communication during both interviews and focus groups suggests that participants considered it fundamental to organisational functioning. Yet language barriers in documentation and training, combined with fear-driven communication practices, exacerbated existing problems to effective information flow. These gaps not only constrained daily exchanges but also influenced how training was delivered and understood, underscoring the close connection between communication practices and the effectiveness of skills development within the organisation (Griffith, 2006). Drawing on these insights, the organisation could strengthen its approach by aligning goals, clarifying responsibilities, offering constructive feedback, and integrating visible systems for information exchange; measures shown to reinforce a positive FSC (Griffith *et al.*, 2010a; Manning, 2017; Watson *et al.*, 2018).

Supervision

Supervision emerged as a dominant theme in the focus groups but less so in the observational assessment and was absent from the interviews. This difference suggests that while participants perceived supervision as a concern in group-based settings, it was less visible in daily practices and may not have been prioritised in individual discussions. The findings point to a disconnect between senior leadership and middle or frontline management in translating the organisation's food safety vision into practice, reinforced by uncertainty around supervisory responsibilities. The misalignment between perceived importance and observed significance highlights potential barriers to the reliability and influence of supervisory practices, which may challenge consistency in FSC. These insights suggest that supervision cannot be assessed in isolation but must be grounded within the broader context of leadership, where alignment between strategic direction and day-to-day management is essential for sustaining a strong FSC (Pai *et al.*, 2024).

Recognition and Appreciation

An ongoing lack of recognition and appreciation was also identified, extending beyond surface-level concerns to deeper issues of fairness in the sharing of rewards and opportunities. Participants characterised recognition as inconsistent or selective, often coupled with a compliance-driven, fear-based approach. In both interviews and focus groups, employees reported working beyond the scope of their job descriptions without receiving any form of acknowledgement. These findings indicate that recognition is not only about tangible rewards but also about valuing employee contributions and perspectives, an element essential for fostering engagement and reinforcing food safety practices (Spagnoli *et al.*, 2024). Moreover, concerns around recognition were closely tied to broader perceptions of equity and fairness, where inconsistent acknowledgement and unequal opportunities reinforced a sense of variation across the organisation.

Responsibility and Accountability

Responsibility and accountability were more evident in the interview data than in the focus groups or observations. Participants pointed to unclear reporting lines, ambiguity over authority, and a lack of accountability for operational changes. Such gaps reflect weaknesses in governance structures, where responsibilities are not consistently defined or enforced. Clearly defined roles and accountability frameworks are critical for embedding a strong FSC (FSSC 22000, 2023). As Jespersen and Huffman (2014) emphasise, attention to the human dimension is equally important, ensuring that employees not only understand their responsibilities but also feel aligned with the organisation's mission. These findings connect directly to the organisation's broader food safety strategy, where unclear responsibilities were mirrored by the absence of measurable objectives and direction.

Lines of authority

In both interviews and focus groups, participants highlighted concerns about lines of authority, while this theme was far less visible in the observational data. The comments pointed to blurred hierarchies and overlapping responsibilities, which contributed to delays in decision-making and slow responses to operational issues. Instead of reinforcing accountability, unclear authority created uncertainty over who was responsible for specific tasks, weakening the chain of command. When authority is not consistently recognised, leadership influence becomes diluted and the organisation's capacity to embed robust food safety practices is compromised (Spagnoli *et al.*, 2025).

Training and Skills

Training and skills were identified as a concern in both the interviews and the observational assessment, though it was less frequently raised in focus groups. Participants questioned the effectiveness of existing in-house programmes, noting limited opportunities for continuous development. While regular training is essential for ensuring that employees are informed and equipped to apply food safety practices, research demonstrates that training on its own rarely produces lasting behavioural change. Studies dating back to the late 1990s found that training,

without reinforcement, does not significantly reduce incidences of foodborne illness (Ehiri *et al.*, 1997). To improve this, more targeted approaches are recommended, with content adapted to specific risks and behaviour patterns, and FSC assessments used to inform training design (Yiannas, 2009; Zanin *et al.*, 2021). Additional concerns included trainer competence, language barriers, assessment methods, and the perceived undervaluing of hands-on experience in favour of formal qualifications. Collectively, these issues highlight limitations in knowledge transfer and employee empowerment, restricting the role of training as a driver of FSC maturity.

Resources

Concerns around resources were most often linked to equipment maintenance and excessive workload demands. Regular inspection and timely upkeep of equipment are essential to prevent operational breakdowns that may elevate contamination risks. Research indicates that organisations investing financial and human resources into food safety initiatives experience fewer incidences of foodborne illness (Griffith *et al.*, 2010a). Effective food safety leadership therefore requires informed decisions on resource allocation, ensuring that investments strengthen both operational efficiency and safety outcomes (GFSI, 2018).

Equitability, Workload and Incentives

This theme was emphasised mostly in the focus groups, while it appeared less frequently in interviews and was absent from the observational data. Participants reported concerns about perceived bias in rewards and opportunities, uneven workload distribution, and limited recognition for individual or group contributions. These experiences fostered distrust among employees, undermining morale and weakening adherence to food safety practices. Focus groups appeared to provide a setting where participants felt more comfortable raising fairness and equality concerns, often framing their responses in relation to lived experiences of how work was distributed and acknowledged. Although not observed directly, these reflections suggest that fairness is perceived as a cultural concern, shaping how employees interpret their value within the organisation and the organisation's commitment to food safety.

5.3.5 Outlier Themes from Interviews and Focus groups

The type of methods employed influenced the emergence of certain themes, with some found only in either interviews or focus groups. Interviews often yielded richer and more personal insights, particularly on issues that participants may not have felt comfortable raising in a group setting. These themes revolved around interpersonal relationships and leadership concerns. In contrast, focus group discussions highlighted shared experiences and collective interactions, demonstrating how employees recognise and address FSC in a group context.

Outlier Themes Unfolding Exclusively in Interviews

Leadership

Effective leadership is central to shaping organisational culture, embedding safe practices, and sustaining food safety as a strategic priority (Pai *et al.*, 2024). Leadership concerns surfaced only in the interviews, suggesting that participants viewed this as a personal topic better discussed privately. Findings pointed to challenges characterised by limited responsiveness to social conflict and an inclination toward reactive rather than preventative approaches to food safety. Participants reported that power struggles and misaligned goals often slowed decision-making, while a lack of strategic direction and limited conflict management developed the sense of disconnection among employees. Collectively, these insights indicate that leadership was not always providing the clarity or stability needed to foster a resilient FSC (Pfeffer, 1981).

Functioning as an effective team and egos

Team functioning and egos did not emerge as themes in the focus groups, likely influenced by the presence of peers, but were raised in the interview discussions. Participants discussed difficulties in sustaining effective collaboration, with internal power dynamics and personal conflicts undermining cohesion. These contradictions not only disrupted teamwork but also undermined efforts to integrate a strong FSC. Addressing such interpersonal barriers is critical, as unresolved pressures within teams can undermine trust, delay decision-making, and compromise organisational performance (Nayak & Waterson, 2017).

Food Safety Objectives and Strategy

Food safety objectives and strategy also emerged primarily in the interview data, reflecting both the responsibilities of the participants and the suitability of the interview setting for discussing higher-level organisational priorities. Remarks highlighted the availability of objectives and key performance indicators (KPIs), alongside the importance of using data to reduce bias and target areas needing improvement. Ongoing risks, such as concerns about *Listeria* despite heat treatments and recurring issues with foreign bodies, were also raised. These findings suggest limitations in how strategic objectives are operationalised, pointing to leadership oversight and limited engagement in translating goals into inclusive practices across the organisation (Frankish *et al.*, 2023).

Outlier Themes Emerging Exclusively in Focus Groups

Promotion opportunities and Transparency

Promotion opportunities and transparency surfaced as an outlier theme raised only in the focus groups. Participants reported that new positions were sometimes filled before being officially advertised and described perceptions of favouritism linked to personal relationships. These concerns highlighted the need for greater transparency, not only in promotions but also in food safety practices and audit results, as a means of fostering trust and strengthening cross-departmental relationships. The significance of this theme in focus groups may be explained through social facilitation, where the presence of peers encouraged individuals to conform to group norms and voice concerns considered socially acceptable (Morgan, 1997; Mueller & Zentall, 2024).

The multi-method qualitative design enriched the analysis by integrating various perspectives and enabling triangulation, which developed an understanding of the organisation's FSC. Comparing data across methods helped validate participant comments and provided a more balanced view. Each method offered distinct contributions: interviews generated detailed, personal insights, particularly from those in leadership roles; focus groups highlighted themes shaped by collective experiences that might not have surfaced in individual discussions; and the

observational assessment contributed a practical lens, validating or challenging self-reported findings and drawing attention to issues employees may have been hesitant to disclose. Collectively, these methods produced a more integrated understanding of both the cultural and operational dimensions of food safety, describing where targeted interventions can bridge strategic priorities with daily practice and strengthen FSC resilience.

CONCLUSION

This research study aimed to assess FSC within a prominent wet condiment manufacturer in South Africa through a secondary data analysis of interviews, focus groups, and an observational assessment. Triangulating these methods provided a richer perspective than any single approach could achieve. Interviews captured personal reflections, focus groups revealed collective experiences, and observations shed light on everyday practices; together, illustrating how food safety is understood, integrated, and at times weakened across the organisation. The findings further demonstrated that while food safety is valued in principle, it is not consistently embedded in practice. Operational risks and workflow pressures, coupled with gaps in communication, respect, and trust, appeared as ongoing challenges. Alongside these, concerns about recognition, fairness, training, and resources revealed how cultural and structural factors are interconnected. The results point to an organisation where commitment is evident but limited by challenges that prevent its integration into behavioural routines. Strengthening FSC therefore requires not only improved systems but also visible leadership, equitable processes, and significant engagement with employees as stakeholders in food safety rather than passive participants (Spagnoli *et al.*, 2024).

The qualitative assessment offered insightful and grounded insight into how FSC is understood and implemented within the organisation. A key strength of this stage was the triangulation of interviews, focus groups, and the observation assessment, which together formed a detailed and reliable representation of the organisation's culture. The combination of individual, collective, and behavioural perspectives captured the complexity of organisational practices and added richness to the interpretation of FSC. While these findings provide valuable depth, they

remain situated within the specific context of one organisation. The analysis was informed by secondary qualitative data collected during the original study, which meant that opportunities for follow-up questions or further probing were not available. Additionally, differences in language, educational background, and job functions may have influenced how participants expressed or interpreted certain ideas. Nonetheless, these same factors broadened the range of perspectives represented and contributed to a more detailed, holistic understanding of the organisation's FSC. Building on these insights, the findings extend beyond the immediate organisational context to offer considerations that are relevant to broader discussions of FSC.

This research study contributes to the wider body of knowledge by highlighting FSC in an under-researched sector and by demonstrating how organisational culture and food safety practices intersect. The findings highlight the importance of interventions that connect strategic priorities with daily practice, reinforce trust and accountability, and invest in the individuals who implement food safety practices at the operational level. A resilient FSC is not static; it must be nurtured, challenged, and renewed over time. As emphasised by da Cunha *et al.* (2025), Yiannas, (2009), and Thorsen *et al.* (2025), FSC cannot be built through technical compliance alone. It strengthens when reflected in everyday decisions, in the way leaders lead, and in how employees collaborate with one another. For this organisation, and for the wider industry, the way forward lies in ensuring that food safety is not only a regulatory requirement but a lived organisational value.

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CHAPTER 6:

Improving Food Safety Culture in the Condiment Industry: Exploring Contemporary Design Thinking Methodologies

An original research article for submission partially or in full to Food Control (Elsevier; ISSN 1873-7129).

ABSTRACT

Introduction and Aim

Food safety culture (FSC) is shaped less by incentives than by the daily reinforcement of values and behaviours that foster trust, recognition, and shared responsibility. This shift moves beyond technical systems alone, recognising that communication, leadership and psychological safety are what enable employees to carry food safety into their everyday work. This study explores FSC in a South African wet condiment manufacturing organisation, where limited research on FSC has been conducted, despite the company's public health relevance. Building on quantitative and qualitative findings, it introduces three context-specific prototypes that move beyond compliance to address behavioural and operational barriers. The aim is to show how tailored strategies, grounded in local realities, can both strengthen FSC and foster organisational resilience in an emerging economy context.

Methodology

An adapted Stanford Design Thinking model was applied to translate employee insights into practical interventions for strengthening FSC. Drawing on secondary data, including surveys, interviews, focus groups, and an observational assessment, the process moved from understanding experiences to defining barriers and developing context-specific prototypes. While not piloted, the approach ensured that solutions remained grounded in organisational realities and employee perspectives.

Results

The research study identified key barriers to the organisation's FSC, including limited leadership visibility, fragmented communication, inconsistent recognition, and language and training challenges. Through the adapted design thinking process, these findings were translated into three prototypes: Translated for Food Safety, providing bilingual and accessible training; Cultural Artefacts of Food Safety, embedding visible reminders into daily routines to reinforce shared values; and an Integrated Internal Audit: FSC Assessment and Sentiment Analysis incorporating

an FSC assessment and automated AI-based sentiment analysis to improve the existing internal audit template.

Conclusion

This research study highlighted that improving FSC requires strategies grounded in employees' lived realities. The prototypes were designed for adaptability and practical use, offering evidence-informed strategies that bridge research and practice. Looking ahead, emerging tools such as AI-enabled design thinking and sentiment analysis present opportunities to enhance inclusivity, scalability, and responsiveness.

Keywords: Food safety culture, wet condiments, design thinking, prototypes, training, artefacts

6.1 BACKGROUND

The emergence of FSC marks a significant shift towards a holistic strategy that incorporates human and cultural determinants into safeguarding the food supply chain. Rather than focusing exclusively on systems and technical measures, FSC recognises and evaluates the underlying drivers of food safety behaviours, examining how factors such as leadership commitment, communication, training, and employee engagement shape organisational outcomes. This evolution, motivated by the imperative to prevent foodborne illness and reinforce consumer trust, has informed the development of a range of models and frameworks, including the BRCGS FSC Excellence module, the integration of FSSC 22000 with ISO 22000, and sector-specific initiatives designed to address unique industry needs (Pai *et al.*, 2024; da Cunha *et al.*, 2025a). At the heart of FSC are the principles of shared responsibility, open communication, and continuous improvement. Food safety is understood as a collective responsibility that extends across all organisational levels, supported by open communication free from reprisal and by a commitment to adaptation and learning. Together, these constructs provide a sustainable foundation for integrating human behaviour, organisational processes, and leadership practices into a cohesive framework that strengthens public health protection (Nyarugwe *et al.*, 2016; Spagnoli *et al.*, 2025).

The formal recognition of FSC within food safety standards further reflects its growing global recognition. Organisations and regulatory bodies, most notably the Global Food Safety Initiative (GFSI), have endorsed its importance, reinforcing demands for harmonisation and standardisation across sectors (GFSI, 2018). Over time, FSC has been systematically integrated into food safety management systems (FSMS) such as ISO 22000, BRCGS, and FSSC 22000, ensuring that it is not positioned as a peripheral or isolated concept but as an essential component of comprehensive management systems (BRCGS, 2018; FSSC 22000, 2023). Nonetheless, sectoral variations continue to present challenges, underscoring the need for FSC to be adapted and scaled in response to diverse regulatory, operational, and cultural contexts (da Cunha *et al.*, 2025a).

The Food Safety Culture Assessment and Intervention Value Chain

Advancing FSC requires a structured value chain approach that begins with accurate assessment and extends through targeted interventions. Figure 6.1 offers an FSC improvement pipeline. Each stage of this chain builds on the previous one, meaning that the integrity of early assessments directly influences the success of subsequent actions. Accurate and ethical evaluation forms the foundation of the FSC value chain, as unreliable assessments can compromise subsequent improvement efforts (Thorsen *et al.*, 2025). Building a strong FSC requires leaders to visibly apply their commitment through resource allocation and consistent communication, alongside active employee engagement at all organisational levels. Empowering employees to contribute ideas, supported by effective communication, structured training, and clear objectives, is essential for integrating food safety as a shared organisational value (Pai *et al.*, 2024; Ferreira *et al.*, 2025).

Ongoing evaluation is vital to interpret the cultural setting and reduce the risk of superficial or biased conclusions (Thorsen *et al.*, 2025). Employing various methodologies, such as surveys, interviews, focus groups, and observational assessments offers a refined view of employee attitudes, leadership practices, communication, and training effectiveness. The insights gained provide actionable evidence that guides interventions, informs resource allocation, and tracks progress toward cultural change (Ferreira *et al.*, 2025). The rigour of FSC assessments depends on reliable and valid data collection, which applies strategies such as standardisation, triangulation, and statistical validation. Reliability ensures consistency and accuracy, while validity confirms that tools accurately measure the intended constructs (Cassim, 2021). Triangulation further strengthens assessments by integrating multiple data sources and perspectives, thereby reducing bias and offering a more comprehensive and credible understanding of organisational culture.

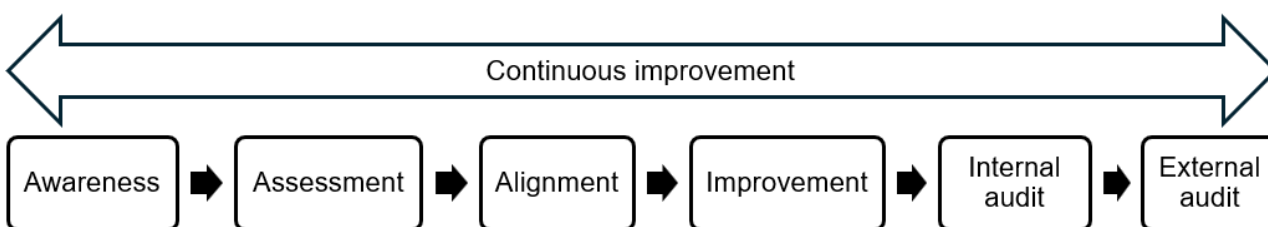


Figure 6.1. The Food Safety Culture Improvement Value Chain (Thorsen *et al.*, 2025)

Principles and Methodologies of Effective Alignment and Interpretations with Solutions

The element of compliance introduces an additional layer of complexity to the interpretation of FSC assessments. Ensuring agreement with established standards is essential to guarantee that interventions are both contextually appropriate and certifiable, even where terminology varies. For instance, an assessment tool may describe the construct of “inspiration,” while certification frameworks may require demonstrable evidence of an “inspired” workforce (da Cunha *et al.*, 2025b). Such anomalies highlight the importance of careful integration to avoid misinterpretation. Challenges also arise from the breadth of assessment categories and the frequent overlap of constructs, where dimensions such as leadership, communication, and engagement intersect across multiple areas of evaluation (Zanin *et al.*, 2021).

Leadership exemplifies this plurality, as it encompasses attributes such as empathy, trust, integrity, and communication, while also extending to structured leadership development initiatives. Regulatory frameworks increasingly recognise these complexities and incorporate them into evolving requirements. The FSSC 22000 guidance document, revised in 2023 to align with version 6, reflects these growing expectations, while the GFSI benchmarking requirements establish obligations that must be adopted by certification programme owners and verified during onsite audits (FSSC 22000, 2023). Similarly, the ISO 22000:2018 (clause 5.1) mandates that top management establish, implement, and maintain food safety and quality culture objectives as integral components of the management system. The standard also highlights the importance of communication, training, feedback, engagement, and performance evaluation, thereby acknowledging the role of qualitative methods in capturing cultural interactions. Expanding on this, FSSC 22000 version 6 (Part 2, section 2.5.8) specifies additional requirements

related to defined roles and responsibilities, training, and decision-making, with interviews recognised as a key qualitative tool for interpreting and monitoring these elements (FSSC 22000, 2023).

Methodologies for Data Interpretation

Interpreting FSC data is inherently complex, as it involves capturing not only numerical patterns but also the cultural and behavioural interactions that shape organisational practices. To address this complexity, a range of complementary methodologies can be applied, each contributing unique strengths to ensure that findings are rigorous, meaningful, and aligned with real-world application (Cassim, 2021). Cognitive progression extends beyond simple knowledge gaining to encompass the development of analytical, adaptive, and creative skills that are essential for interpreting data, recognising patterns, and generating meaningful solutions. Within the context of FSC, this progression enables researchers to critically evaluate findings, identify potential biases, and apply innovative thinking to address complex organisational challenges (Bezanilla *et al.*, 2023; Inayah & Lubab, 2023).

Moreover, quantitative and qualitative data analysis approaches contribute complementary strengths to this process. Quantitative methods provide statistical reliability, allowing for the measurement of relationships between variables and the generalisation of findings across contexts (Cassim, 2021). However, the cultural and behavioural dimensions of FSC are not always reducible to numerical expression, making qualitative methods essential. Approaches such as interviews, focus groups, and observational assessments capture the intricacy, context, and lived experience of employees, offering depth that numbers alone cannot provide (Saunders *et al.*, 2023). The integration of both methodologies' balances breadth with depth, enhances validity, and supports triangulation, thereby strengthening the overall quality and interpretive strength of the analysis (Cassim, 2021). In addition, peer and expert panel review further reinforce the credibility of interpretations by contextualising findings, validating triangulated data, and uncovering potential blind spots or biases. Drawing on a variety of perspectives and subject-matter expertise, such panels contribute to conclusions that are not only more rigorous

and nuanced but also more closely aligned with practical, real-world solutions (FSSC 22000, 2023; Saunders *et al.*, 2023).

The introduction of design thinking offers an additional methodology that complements traditional analytical approaches by providing a structured, yet flexible framework rooted in empathy, iteration, and problem-solving. By grounding interpretation in human experience and translating insights into actionable solutions, design thinking facilitates the development of interventions that are both culturally relevant and operationally sustainable (Gallanis, 2020; Brown, 2009; Liedtka, 2015). Collectively, these methodologies establish a robust toolkit for the interpretation of FSC data. By combining critical analysis, methodological integration, peer and expert validation, and human-centred design, they enable the development of insights that are credible, actionable, and context-sensitive, thereby strengthening both the academic investigation and practical application of FSC.

The Psychology of Sentiments as an Interpretation Method

Psychological determinants play a central role in interpreting human behaviour, complementing biological factors such as character, perception, cognition, and prior experience (Hagger, 2025). Within the food sector, learned experiences in particular strongly influence organisational behaviours and practices (Kondalkar, 2007). Classical conditioning, where behaviours expand through association, and operant conditioning, where actions are reinforced or discouraged through reward or punishment, help explain how experiences shape future responses (Akpan, 2020). For instance, positive recognition may strengthen work ethic and encourage commitment to food safety, while negative managerial experiences can foster avoidance behaviours or heightened anxiety (Hagger, 2025).

Automated Sentimental Analysis Methods

In today's digitally interconnected food systems, sentiment analysis can be used as a tool for reinforcing FSC within organisations. Automated sentiment analysis provides an advanced methodological approach for interpreting employee perceptions of FSC (Ashbaugh & Zhang, 2024). By applying artificial intelligence (AI), natural language processing (NLP), and machine learning techniques, these methods can analyse employee feedback to identify underlying sentiments such as satisfaction, frustration, or disengagement. These insights offer a deeper understanding of organisational culture and can be used to guide targeted interventions (Chen *et al.*, 2024; Thorsen *et al.*, 2025). Emotions subtly shape much of human behaviour, and when employees experience positive feelings in their daily work, it supports both their well-being and the development of a stronger, more resilient organisational culture (Dockray & Steptoe, 2010). Beyond broad sentiment trends, automated analysis can detect more specific indicators, such as stress, dissatisfaction, or burnout, thereby enabling proactive strategies to strengthen employee well-being. Compared with manual or less sophisticated methods, automated sentiment analysis offers significant advantages, including the establishment of real-time insights, greater objectivity through reduced bias, scalability across large datasets, and the capacity to track cultural change longitudinally (Hossain *et al.*, 2022). Collectively, these strengths enhance decision-making and ensure that interventions remain aligned with the evolving dynamics of organisational culture (Chen *et al.*, 2024; Zanin *et al.*, 2021; Thorsen *et al.*, 2025).

Contextualising Food Safety Culture in South Africa

Despite its global recognition, FSC has received limited attention in the South African context, with research especially limited in underrepresented sectors such as wet condiment manufacturing. While the evolution of food safety and regulatory systems is well documented (Pai *et al.*, 2024; Jespersen *et al.*, 2019), relatively little is known about the behavioural and operational drivers that are unique to condiment production. Addressing this gap is essential for developing context-specific approaches to FSC within emerging economies. This chapter therefore proposes a tailored approach to FSC improvement in the South African wet condiment

manufacturing sector. Although international frameworks provide valuable foundations, they do not adequately reflect the country's regulatory, cultural, and operational realities. Drawing on integrated quantitative (Chapter 4) and qualitative (Chapter 5) findings, this study introduces three context-specific prototypes designed to address systemic and behavioural limitations beyond compliance, with the fundamental purpose of strengthening FSC, protecting public health, and enhancing organisational resilience.

6.2 METHODOLOGY

In this research study, design thinking was used as the guiding approach for shaping interventions that respond to the barriers affecting FSC within the wet condiment manufacturing organisation. The work builds on the secondary analysis of existing quantitative and qualitative data, which provided the insight and contextual grounding needed to inform each stage of the design process. To give this approach structure and direction, the Stanford Design Thinking model was adapted as the framework through which the proposed interventions were developed and interpreted.

6.2.1 *Design Thinking as a Methodology*

Design thinking was applied in this research study to strengthen the organisation's FSC both in theory and in practice, offering a human-centred and iterative approach that begins with understanding individuals and the environments in which they operate (Gallanis, 2020). By highlighting empathy, desirability, feasibility, and prototyping, the process facilitates the creation of solutions that are not only functional but also sustainable, ensuring that outcomes remain relevant to the individual and contexts they are intended to support (Brown, 2009; Liedtka, 2015). Although originally rooted in design disciplines, design thinking is now widely applied by professionals without formal design training, with the literature highlighting a growing need for adaptable approaches that expand the mindsets and skills required for innovation across diverse sectors (Castanho *et al.*, 2024). In this way, design thinking serves as an adaptable methodology that supports the development of culturally relevant and technically

sound innovations, particularly in specialised sectors such as the wet condiment industry, by remaining grounded in individual and organisational needs.

For the purpose of this research study, the Stanford Design Thinking model (Figure 6.2) was adapted to guide the research. The original model consists of five stages, which includes: Empathise, Define, Ideate, Prototype, and Test. However, for this research study the Test stage was not included, and a Conclusion stage was introduced to synthesise the findings and provide direction for future application. This adaptation enabled the development of context-specific and actionable prototypes, while recognising that empirical testing would be undertaken in subsequent research or organisational practice. All data informing this chapter were drawn from secondary data sources within the overarching research study, for which ethical clearance had been formally obtained (Appendix G).

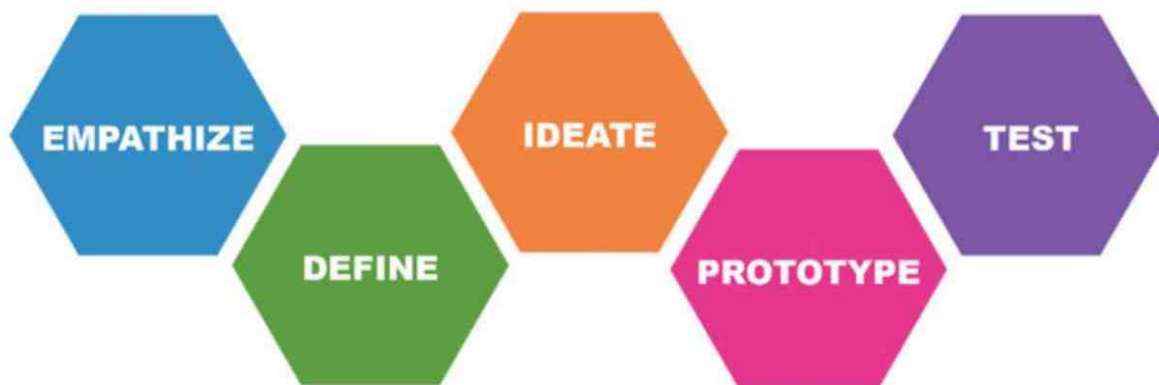


Figure 6.2. The Stanford Design Thinking Process (Gallanis, 2020)

6.2.1.1 Empathise Stage

The Empathise stage was structured to build a detailed understanding of employees' perspectives, behaviours, and experiences relating to FSC, beginning with the secondary quantitative survey data presented in Chapter 4, which provided a baseline for assessing the level of FSC maturity, and then on secondary qualitative findings from interviews, focus groups, and an observational assessment discussed in Chapter 5, which offered a more nuanced view of organisational processes. The interviews provided scope to evaluate individual experiences and

perspectives, while the focus groups highlighted interdepartmental insights into organisational culture, communication, and practices, and the observational assessment provided real-world evidence of employees' behaviour and interaction in their work environment. These different data sources were triangulated to identify the problems addressed in the Define stage, ensuring that the analysis captured both breadth and depth in understanding FSC within the organisation.

6.2.1.2 Define Stage

In the Define stage, the information and insights collected during the Empathise stage were brought together and transformed into clear, actionable, and human-centred problem statements, ensuring that the data collected could be effectively applied to the development of practical solutions (Castanho *et al.*, 2024). The patterns that emerged across constructs in the quantitative data were analysed to reveal broader organisational themes, while the qualitative data added detail by highlighting recurring barriers to FSC and to overall organisational performance, thereby adding context to the statistical findings. By triangulating these methods, it became possible to validate both systemic and behavioural themes, strengthening the robustness of the analysis and ensuring consistency across sources. As such, the resulting problem statements reflected not only the themes identified in the quantitative assessment but also the insights from the qualitative methodologies, which combined created a strong foundation for the Ideate stage. As Gallanis (2020) noted, the Define stage plays an important role in fostering an understanding of problems that is grounded in awareness, which is vital to ensuring that resulting solutions are mythologically feasible and contextually relevant to the environment in which they are applied.

6.2.1.3 Ideate Stage

The Ideate stage focused on the generation of creative and actionable concepts that directly responded to the problem statements formulated during the Define stage, ensuring that the analysis moved beyond identification of challenges to the development of possible solutions. Within the design thinking framework, this stage is viewed as a responsive process in which creativity is not abstract but grounded in pragmatism, thereby maintaining a strong relationship

between human experience and organisational needs (Castanho *et al.*, 2024, Gallanis, 2020). In this research study, the commonly recognised “How Might We” (HMW) framework (Ahmad *et al.*, 2024) was adapted into a “How Can We” (HCW) framework to encourage outcome-focused reflection that resonates with the organisational context, while maintaining the exploratory purpose of the original method. The revised phrasing emphasised shared responsibility, which aligned more effectively with participants in the food manufacturing environment. Each problem statement was reframed into an open-ended question, encouraging consideration of varied possible solutions rather than limiting the scope. The questions were grouped into thematic areas reflecting earlier research stages, with concept generation guided by the researcher and informed by all available data to address the structural and organisational dimensions of FSC.

6.2.1.4 Prototype Stage

During the Prototype stage, the “How Can We” questions were developed into organised interventions, building on earlier insights and translating them into tangible outcomes that could be refined through further exploration. Within the design thinking framework, this stage is considered essential as it enables ideas to be tested for both feasibility and desirability before any attempt at large-scale implementation, thereby lowering risk while enhancing contextual relevance (Gallanis, 2020). In this research study, three concept-driven prototypes were developed, each structured around its purpose, supporting rationale, process of development, practical considerations for implementation, strategies for engagement, and methods of monitoring.

6.2.1.5 Conclusion Stage

The Conclusion stage combined the outcomes of the four earlier stages, synthesising them into an organised framework for strengthening FSC within the wet condiment manufacturing organisation. The prototypes developed were intended to fit within existing organisational practices and can be applied during food safety audits, helping to bring cultural considerations into everyday practice. This stage also points to the potential of automated design thinking and

sentiment analysis as future interpretive enhancements. In the context of this study, sentiment analysis is proposed as a complementary exploratory tool rather than a validated measurement instrument, and was not formally applied or tested within the present research.

The overarching research study was guided by an explanatory sequential mixed methods design (Creswell & Plano Clark, 2018). This design signifies the growing recognition that no single method can fully capture the intricacy of FSC, and that triangulation is necessary to enhance validity, adopt multiple perspectives, and provide richer insights into the interaction between formal systems and informal practices (Pfeiffer *et al.*, 2016). This approach highlights the challenge of aligning organisational oversight with the human dimensions of culture, addressed through FSC tools that monitor leadership visibility and employee motivation (Pai *et al.*, 2024; Lin & Roberts, 2020).

6.2.2 Application of the Design Thinking Model to this Study

The adapted design thinking strategy shaped both the structure and progression of this chapter, ensuring that the research study moved logically from the identification of challenges to the generation of practical responses. While earlier chapters engaged directly with the broader research problem, this chapter applies the design thinking model specifically to bridge the gap between employee insights and the development of targeted interventions, thereby linking evidence to application in a systematic way. The model offered a structured way of interpreting lived experiences, translating them into design opportunities, and shaping interventions that were both practical and contextually relevant. This chapter brings to light barriers to FSC and, through the lens of design thinking, illustrates how rigorous as well as responsive processes can be applied to address them with evidence-based solutions.

6.2.3 Data Collection

Chapter 2 of this research study discussed the methodological approaches used to collect both quantitative and qualitative data. The quantitative component consisted of a survey questionnaire based on a five-point Likert scale, which was designed to assess five constructs of FSC: vision, inspiration, empowerment, performance, and change appetite. To ensure a standardised perspective on employee attitudes and behaviours, no sampling was undertaken for the survey questionnaire, and all employees were invited to participate. The qualitative component complemented this through employing interviews, focus groups, and an observational assessment, methods that were selected to better understand the context, feelings, and behaviours that could not be equally represented through quantitative measures alone. Data collection for the qualitative assessments relied on a combination of purposive and convenience sampling, with specific emphasis on individuals in leadership and senior positions, to gather perspectives that reflected operational and strategic levels within the organisation. All data were originally collected by the primary investigator as part of a broader study and were subsequently re-analysed for the purpose of this research study. Chapter 2 outlines these processes in detail, alongside the ethical clearance that supported the study design.

6.2.4 Data Analysis

The quantitative data (Chapter 4) were analysed to identify challenges across the FSC constructs, providing a baseline for assessing organisational characteristics. Descriptive and comparative analyses were employed to assess the maturity of each construct and to determine the organisation's overall FSC maturity. The qualitative data (Chapter 5) were analysed thematically, following the procedures set out by Braun and Clarke (2006) and Maguire and Delahunt (2017), that involved a systematic process of coding, categorising, and synthesising key themes. As this research was based on secondary data, both datasets were re-analysed to extract insights relevant to the development of targeted interventions. Following this analysis, several FSC barriers were identified, highlighting areas in need of intervention.

6.3 RESULTS AND DISCUSSION

This section discusses how the findings were integrated within the design thinking framework, showing how the outcomes of the quantitative and qualitative assessments were combined to inform the development of the prototypes. Through this approach, the insights were integrated and translated into practical interventions and considered against the overarching research objectives.

6.3.1 Empathise Stage

The quantitative analysis showed that although employees demonstrated a strong commitment to food safety, this dedication was not consistently reinforced within the organisation's processes. Respondents identified leadership and communication as their primary concerns, while also highlighting gaps in the effectiveness of the training received and lack of equipment maintenance. Additional findings related to transparency of audit results and change appetite suggested that employees were generally open to improvement; though, organisational frameworks and enabling structures were often fragmented. As Nyarugwe *et al.* (2016) recognise, FSC develops through the interaction of leadership, communication, training, and technical resources, and sustained performance depends on their alignment.

The qualitative investigation provided deeper insight into how responsibilities were interpreted and behaviours enacted across organisational levels. Themes of operational flow, food safety risk, respect, recognition, and trust emerged, with communication appearing as a central connecting factor. Participants described fragmented team dynamics, limited collaboration, constrained resources, and reduced leadership visibility. These patterns reflect observations by Nayak and Waterson (2017), who note that weak collaboration and limited leadership engagement may undermine food safety performance even when individual commitment remains strong.

Collectively, the Empathise stage identified structural and behavioural factors that constrained the consistent enactment of FSC. These insights informed the reframing of issues in the Define stage, where they were distilled into clear and actionable problem statements.

6.3.2 Define Stage

In the Define stage, the triangulated findings were refined into clear, human-centred problem statements that structured the foundation for targeted interventions. Rather than restating the empirical findings, this stage reframed recurring gaps in leadership visibility, communication consistency, recognition practices, training access, operational coordination, and strategic alignment into concise statements that captured their impact on FSC. Although employees expressed general confidence in leadership, the data indicated inconsistencies between stated commitment and everyday experience, particularly regarding feedback, recognition, and engagement. These findings align with research identifying leadership commitment, shared responsibility, and strong organisational values as central drivers of FSC beyond procedural compliance (Griffith *et al.*, 2010; Yiannas, 2009; Zanin *et al.*, 2021). While the organisation complies with internationally recognised standards, further integration of these systems into routine practice appears necessary (Johnson *et al.*, 2022).

Table 6.1 synthesises the main themes and demonstrates how each barrier emerged across multiple data sources. The analysis suggests that incremental adjustments alone are unlikely to address the deeper structural and cultural gaps identified. A resilient FSC depends not only on system adherence but on leadership accountability, consistent engagement, and the alignment of organisational values with everyday practice (Frankish *et al.*, 2023). These insights were consolidated into actionable problem statements (Table 6.2), providing a structured basis for the Ideate stage and guiding the development of contextually relevant interventions.

Table 6.1. Barriers to Food Safety Culture Highlighted in the Define Stage

Theme	Barrier Description	Methodology	Significance for Food Safety Culture
Leadership	Limited visibility, reduced engagement, variability in execution	Quantitative, Qualitative	Reduces perceived reliability and weakens normative guidance
Communication	Inconsistent channels, limited feedback, language constraints	Quantitative, Qualitative	Reduces transparency, challenges integration, and may foster uncertainty
Recognition and fairness	Variable recognition, perceptions of workload and opportunity imbalance	Qualitative	Lowers motivation and may contribute to disengagement
Training and resources	Training primarily in English, variable delivery, limited tools and equipment	Quantitative, Qualitative	Constrains knowledge transfer and restricts consistent safe practices
Operational flow	Fragmented teams, operational delays, limited cross-functional collaboration	Qualitative	Generates inefficiencies and elevates compliance risks

These insights were brought together, interpreted, and shaped into actionable design criteria. The findings were reframed into problem statements (Table 6.2) that revealed the underlying reasons of the barriers and provided a foundation for generating contextually relevant interventions.

Table 6.2. Problem Statements Developed from Findings

Theme	Evidence from Empathise Stage	Problem Statement
Leadership	Limited interaction with leadership, lack of role-modelling, variability in follow-through	Leadership visibility and alignment with FSC priorities are inconsistent, creating a sense of disconnection
Communication	Inconsistent messaging, limited feedback, siloed information flow	Communication practices are uneven and lack consistent two-way feedback across departments
Recognition and fairness	Employees excluded from decisions, limited acknowledgement, perceived inequities in workload and opportunities	Decision-making is not fully inclusive, and recognition mechanisms are perceived as inconsistent
Career growth and equity	Limited career development, uneven distribution of resources and training	Career development and training opportunities are uneven, which may contribute to frustration and disengagement
Training and resources	Variable access to tools, training, and balanced workloads	Differences in resource availability and workload distribution affect morale and effectiveness
Strategic alignment	Employees committed to food safety but disconnected from strategic goals	Organisational strategies are not always aligned with employees' intrinsic motivation for food safety

6.3.3 Ideate Stage

The Ideate stage translated the defined problem statements into structured “How Can We” (HCW) questions, shifting the focus from diagnosis to solution development. This approach enabled the systematic exploration of practical responses grounded in the organisational context. The commonly recognised “How Might We” (HMW) framework (Ahmad *et al.*, 2024) was adapted into a “How Can We” (HCW) format to encourage outcome-oriented reflection while maintaining the exploratory nature of the method. The revised phrasing emphasised shared responsibility, aligning with the operational environment of food manufacturing. Each problem statement was reframed into an open-ended question to broaden the scope of potential solutions and avoid premature narrowing of options.

The “How Can We” questions were grouped into thematic areas reflecting the earlier stages of analysis. Concept generation was guided by the researcher and informed by both quantitative and qualitative findings, ensuring that proposed solutions addressed organisational structures as well as behavioural dynamics shaping FSC. Table 6.3 consolidates the HCW questions, thematic areas, and resulting intervention concepts, illustrating how the Define stage informed practical design directions.

Emerging Themes

The themes that emerged signified both the barriers shaping how FSC is experienced and the opportunities for improvement. By addressing these areas, the wet condiment manufacturer can move towards a stronger and more inclusive FSC, that is rooted in everyday routines, strengthened through visible leadership, and sustained as part of ongoing organisational growth.

Leadership and Vision

Leadership emerged as a central influence on FSC, not only through decision-making and communication but through the ability to inspire a shared vision of what safe practice means within the organisation. This aligns with research that positions leadership at the heart of cultural integration, distinguishing it from management, which maintains existing systems rather than shaping new possibilities (King, 2023; Yiannas, 2023). Effective leaders articulate a clear and inclusive vision that connects strategic committed with everyday behaviour, ensuring that food safety is understood as both a collective responsibility and a foundation of organisational commitment. Practical steps may include appointing FSC ambassadors from leadership and top management who can connect with frontline employees, participate in food safety discussions, and demonstrate commitment through visible example. Hernandez (2023) remarks that leaders who communicate openly and foster trust reinforce this shared sense of purpose, while Jespersen *et al.* (2017) emphasise that such leadership must be supported by ethical and inclusive practice. When cross-departmental strategies are translated into visual artefacts and consistent messaging, the organisation's food safety vision becomes visible, lived, and sustained across all levels.

Communication and Inclusion

To improve communication, the organisation could host monthly food safety sessions in both Afrikaans and English, creating a space for open discussion, idea sharing, and regular updates. Hernandez (2023) states that leaders need to tailor communication for diverse groups and align food safety goals with departmental responsibilities. Moreover, King (2023) emphasises that trust and credibility are built through authentic communication, which is essential for shaping behaviour and internalising cultural change. Practical measures can reinforce this foundation; for example, an anonymous feedback system such as a suggestion box would allow employees to share ideas openly and feel included in the organisation's continuous improvement efforts. Visible artefacts, serve as daily reminders of organisational values and priorities, can further support inclusion when they reflect the shared identity of the workforce, provided they are used thoughtfully to avoid unintended interpretations. Literature further indicates that FSC is

reinforced through tangible artefacts and inclusive communication, where visible cues signalling organisational values and open feedback, combined with recognition practices, foster both engagement and psychological safety (Nyarugwe *et al.*, 2016).

Training and Language Barriers

Training materials and documentation should be translated into Afrikaans and presented in plain language with visual aids, making them more accessible and easier to understand. King (2023) states that strong food safety leadership depends on tailoring training to the operational context, particularly by accounting for language and literacy differences. A modular structure, adapted to specific roles and reinforced through short, routine-based sessions led by FSC champions, can help integrate learning into daily practices. Hernandez (2023) further emphasises that training should be closely connected to production-floor activities, as this not only builds credibility but also strengthens engagement. Induction training, in particular, benefits from being transparent, value-driven, and grounded in organisational realities, presenting food safety as a shared responsibility while also linking it to employees' personal and professional goals.

Recognition and Motivation

A structured recognition system, such as a “Food Safety Star” award, can highlight and celebrate employee commitment to FSC. Leadership plays a fundamental role by building trust and credibility, fostering collaboration, and encouraging shared ownership of food safety, while purposeful recognition depends on transparency, integrity, and conformity with organisational goals (Taha *et al.*, 2024). Recognition linked to FSC behaviours, consistently communicated and rooted into career progression, can motivate employees while also reinforcing equality. Hernandez (2023) and King (2023) note that when employees see food safety as integral to their own success, aligning FSC objectives with personal and professional goals fosters ownership and sustains long-term commitment to food safety excellence.

Shared Culture and Engagement

Regular “Food Safety Culture Days” provide a practical opportunity to encourage cross-department collaboration, strengthen interpersonal connections, and foster team cohesion. Hernandez (2023) suggests that cultivating a shared vision is vital for motivating and engaging employees at all levels, while King (2023) highlights the role of authentic, inclusive leadership in fostering ownership and accountability across the system. Actively involving employees in designing campaigns and developing visual artefacts further strengthens the credibility of food safety communication, fostering a shared sense of FSC.

Table 6.3 links the “How Can We” questions to their thematic areas and proposed intervention concepts, offering a holistic view of how the Define and Ideate stages translated into actionable solutions. Each intervention was designed to be both inclusive and practical, while guided by behavioural insights that reflect the intricacies of FSC. Table 6.3 synthesises the earlier stages of analysis and sets the stage for the prototypes discussed in the following section, translating challenges to contextually relevant solutions.

Table 6.3. Linking “How Can We” Questions with Themes and Proposed Interventions

How Can We Question	Thematic Theme	Proposed Intervention Concepts
How can we enhance the visibility of leadership and ensure their agreement with FSC priorities to foster employee support and engagement with the organisation’s vision?	Leadership and vision	Appoint FSC ambassadors from leadership, conduct regular leadership walkabouts, facilitate inclusive strategy sessions, co-create visual artefacts with employees to reinforce alignment
How can we ensure that all departments maintain consistent and effective open communication and feedback mechanisms?	Communication and inclusion	Host monthly food safety discussions, implement an anonymous feedback system, share bilingual updates, use

		artefacts to reinforce shared principles
How can we design inclusive decision-making processes that recognise and value employee contributions?	Communication and inclusion	Facilitate collaborative forums, establish food safety committees with employee representation, co-design visual artefacts to reflect shared responsibility
How can we integrate recognition and opportunities for professional advancement into everyday work to enhance engagement?	Recognition and Motivation	Launch a “Food Safety Star” award, define development criteria linked to FSC behaviours, acknowledge achievements publicly during team meetings
How can we provide equitable access to resources, training, and balanced workloads to reduce frustration and disengagement?	Training and language barriers	Design modular training, translate materials into Afrikaans, deliver short and routine-based training sessions, facilitate collaborative learning led by FSC champions
How can we ensure that our organisational objectives align with employees’ intrinsic motivation to maintain food safety?	Shared culture and engagement	Organise “Food Safety Culture Days”, empower employees to design campaigns, encourage storytelling, facilitate team-building activities
How can we capture and interpret the emotions that shape employees’ experiences of FSC, giving leadership deeper insights to respond more effectively?	Leadership and Engagement	Integrate short FSC questionnaires with emotional descriptors drawn from the Feelings Wheel, supported by automated sentiment analysis to reveal hidden cultural dynamics.

While seven concepts were generated in the Ideate stage, only three were taken forward into the Prototype stage, chosen for their practicality in the manufacturing setting, their connection to the key barriers identified earlier, and their potential to encourage lasting cultural change.

6.3.4 Prototype

The Prototype stage translated the intervention concepts generated during ideation into structured and operational models suitable for application within the organisation. Rather than revisiting the barriers identified earlier, this stage focused on articulating how each intervention would function, how it could be implemented within existing operational structures, and how its effectiveness could be monitored.

Three prototypes were selected for further development based on their practical feasibility, alignment with the defined problem statements, and potential to support sustained cultural change. Each prototype was designed to integrate into existing organisational systems while strengthening behavioural reinforcement and leadership engagement. Although implementation and empirical testing were beyond the scope of this study, the prototypes were developed with consideration of operational constraints, resource requirements, and monitoring mechanisms to support future application.

Table 6.4 presents an overview of the three prototypes and their key components within the broader FSC improvement strategy.

6.3.4.1 Prototype 1: Translated for Food Safety

This prototype introduces bilingual, role-specific food safety training modules designed to improve clarity, retention, and practical application of food safety requirements within the organisation. The intervention restructures existing materials using plain language, context-specific examples, and strong visual aids to ensure accessibility across varying literacy levels and language backgrounds.

Training is organised into short, modular sessions aligned with operational roles, ensuring direct relevance to employees' daily responsibilities on the production floor. A blended format combines printed materials, optional digital access, infographics, and brief knowledge checks to reinforce learning incrementally. This approach reflects the importance of adapting educational interventions to operational context and varied learning needs (Zanin *et al.*, 2021). Each session concludes with a short assessment to evaluate understanding and reinforce accountability. Participation is acknowledged through structured recognition, such as certificates and public acknowledgement during team meetings, signalling that food safety competence is valued within the organisation. Recognition that affirms contribution rather than offering purely symbolic rewards has been associated with sustained engagement (Spagnoli *et al.*, 2023).

Supervisors and designated food safety champions facilitate sessions to strengthen engagement and reinforce leadership presence. Resource allocation includes dedicated employee time for participation, material development, and periodic review to ensure alignment with regulatory updates and organisational changes. Monitoring mechanisms comprise pre- and post-session assessments, supervisory observations, and structured employee feedback to evaluate understanding and behavioural application.

While this prototype focuses on structured, accessible delivery, future refinement could incorporate digital tools to enhance adaptive learning and feedback collection. Such tools were not implemented within this research study but may support continuous improvement in subsequent applications.

6.3.4.2 Prototype 2: Cultural Artefacts of Food Safety

This prototype integrates FSC into the organisational environment through structured visual artefacts designed to reinforce behavioural norms in daily practice. Rather than relying solely on documented procedures, the intervention integrates visible cues such as bilingual signage, infographics, simplified checklists, short videos, and recognition boards to strengthen shared responsibility and accountability.

Organisational culture theory identifies artefacts as the most tangible layer of culture, reflecting underlying values and priorities (Schein, 2010). In this context, artefacts serve not only as instructional tools but also as cultural signals that communicate leadership commitment and reinforce shared expectations (Yiannas, 2009). By making FSC visible within everyday routines, the prototype seeks to integrate food safety principles into operational workflows rather than confining them to formal documentation. The intervention includes redesigned procedures using diagrams, colour-coded sections, simplified layouts, and Afrikaans translations where required to improve accessibility. Visual materials are placed strategically in high-traffic and high-risk areas, including production floors, entrances, restrooms, and communal spaces, ensuring consistent exposure across departments. Artefacts are refreshed quarterly to maintain relevance and prevent familiarisation.

A participatory component strengthens engagement and ownership. Employees contribute to storytelling initiatives and co-create selected visual materials during facilitated workshops, reinforcing their role as active contributors to FSC rather than passive recipients of information. Recognition boards highlight positive behaviours and reinforce accountability, supporting sustained behavioural reinforcement. Implementation requires modest resource allocation for design, printing, and facilitation, alongside leadership oversight to ensure alignment with organisational priorities. Monitoring mechanisms include routine checks of artefact condition and placement, as well as structured employee feedback to assess clarity, relevance, and impact. While visual artefacts provide consistent reinforcement, their effectiveness depends on thoughtful design and maintenance. Outdated materials, cluttered visuals, or poorly contextualised messaging may reduce engagement. Future refinement could explore digital augmentation to support adaptive updates and feedback collection; however, such tools were not implemented within this research study.

6.3.4.3 Prototype 3: Integrated Internal Audit: FSC Assessment and Sentiment Analysis

This prototype extends the internal audit framework by proposing the integration of a structured FSC questionnaire supported by AI-based sentiment analysis as a future interpretive enhancement. Rapid technological advancement has made AI-based tools increasingly accessible for organisational application, opening possibilities for integrating cultural insight into existing governance processes. By incorporating sentiment analysis into the internal audit structure, this prototype seeks to address less visible cultural and psychological dimensions that shape everyday food safety practice (Balakrishnan *et al.*, 2025; Hossain, 2025).

Within the FSSC 22000 certification scheme, internal audits are mandatory and risk-based in frequency (FSSC 22000, 2023). This prototype builds on that existing requirement by introducing a qualitative FSC assessment comprising 10–20 questions focusing on leadership visibility, empowerment, communication, and organisational environment. To enhance interpretive depth, responses would be guided by emotional descriptors derived from the Feelings Wheel (Willcox, 1982). The Feelings Wheel organises emotions from core categories to more nuanced expressions, enabling classification of responses into emotional tones. Research suggests that naming emotions supports reflective processing and emotional regulation (Lieberman *et al.*, 2007), reinforcing the value of structured emotional vocabulary in organisational reflection.



Figure 6.3. The Feelings Wheel (Willcox, 1982)

AI-based tools grounded in natural language processing (NLP) demonstrate potential for identifying patterns within qualitative datasets (Shankar & Tewari, 2025). Although sentiment analysis remains in developmental stages in many sectors and is not yet tailored specifically to food manufacturing contexts (Przegalinska *et al.*, 2025; Mahmoud, 2024), this prototype proposes adapting such tools to align with FSC assessment data. In a future implementation phase, qualitative responses could be analysed to identify recurring emotional patterns that complement procedural audit findings. This integration may help reveal relational and

behavioural dynamics that traditional compliance audits do not fully capture (Chen *et al.*, 2024; Thorsen *et al.*, 2025).

A useful analogy can be drawn from popular cooking shows, where contestants' emotions are often reflected in their dishes, where motivation drives creativity and precision, while discouragement weakens performance. In a similar fashion, employee emotions shape how food safety practices are carried out. Positive emotions such as pride or reassurance foster ownership and accountability, whereas frustration or disengagement can weaken attentiveness and compliance. Sentiment analysis allows leadership to detect these interactions and respond constructively through targeted communication, recognition boards, or visual artefacts that reflect dominant sentiments. In this way, the results provide leadership and top management with a structured tool to engage with employee emotions more directly, transforming sentiment data into actionable opportunities to strengthen morale and FSC.

Any future implementation of this approach would require clear ethical safeguards. The organisation would anonymise emotional data collected through the FSC assessment and analyse it in aggregated form to inform organisational dialogue and continuous improvement rather than individual monitoring or performance management. Leadership would communicate the purpose, confidentiality measures, and voluntary nature of participation to maintain trust and psychological safety. The integration of sentiment analysis would aim to strengthen reflective leadership and cultural insight, not to introduce surveillance practices.

In practical terms, internal auditors would require training in qualitative interpretation, and leadership commitment would be essential to ensure that findings inform visible and constructive action. The development and integration of an AI-based sentiment analysis tool would require financial investment, technical expertise, and phased implementation. This prototype was not implemented or validated within the scope of this research study and is presented as a proposed framework for future empirical testing. If piloted and evaluated longitudinally, this approach could offer a structured method for implementing cultural insight

within internal audit processes, enabling leadership to respond more effectively to the emotional and behavioural dimensions influencing FSC. Further research could explore feasibility, contextual adaptation, and integration into broader auditing systems across food manufacturing environments.

Table 6.4 provides an overview of the design thinking features of the three prototypes. These prototypes respond directly to the barriers identified in this study, collectively representing contextually relevant, real-world, and maintainable approaches to strengthening FSC within the wet condiment manufacturing organisation. Beyond the visible and linguistic barriers, the Empathise and Define stages drew attention to more subtle aspects of FSC, pointing to the need for approaches that look beneath surface-level practices. In response, the third prototype proposes an adaptation of the internal audit framework, integrating a focused FSC component and automated AI-sentiment analysis tools to help leadership engage more effectively with the cultural influences shaping food safety.

Table 6.4. Towards an Integrated Solution Model: Design Thinking for Food Safety Culture

Prototype			
Category	Translated for Food Safety (Prototype 1)	Cultural Artefacts of Food Safety (Prototype 2)	Integrated Internal Audit: FSC Assessment and Sentiment Analysis (Prototype 3)
Overview	Bilingual training materials designed for addressing language and literacy barriers in food safety training	Visible tools such as signage, posters, checklists, and cultural symbols strengthening FSC values in the workplace	Integrating FSC and sentiment analysis into internal audits to enrich cultural understanding
Rationale	Language barriers limit understanding and retention of FSC principles, particularly among Afrikaans-speaking employees	Lack of consistent visual reinforcement weakens FSC; artefacts strengthen accessibility, shared responsibility, and engagement	Internal audits emphasise compliance but overlook cultural and emotional determinant, sentiment analysis reveals hidden FSC barriers
Development	Create translated training content in plain language, supported by visuals, videos, quizzes, and job-relevant modules	Design posters, SOPs, infographics, digital displays, and recognition boards using bilingual text and culturally familiar visuals	Design a short FSC questionnaire (10–20 items) guided by the Feelings Wheel, with sentiment analysis classifying responses into emotional tones

Implementation	Offer short (15–20 min) training sessions focusing on one FSC concept at a time, combine visual and written methods	Integrate into artefacts in high-traffic and role-specific areas; use workshops for co-creation and refresh food safety management systems documents with visuals	Collect qualitative data through interviews and focus groups, then analyse responses with automated AI-based sentiment tool and benchmark against existing platforms.
Frequency	Weekly knowledge checks, ongoing updates to training modules in line with standards and policy changes	Quarterly updates linked to seasonal themes, campaigns, or organisational priorities	Conducted annual internal audits at a minimum, with higher-risk environments requiring biannual or quarterly audits
Visibility	Training progress displayed in team meetings or on noticeboards to encourage shared responsibility and motivation	Artefacts strategically placed in entrances, restrooms, break rooms, and production areas for broad visibility and influence	Results communicated to leadership and employees through reports, recognition boards, and posters highlighting dominant emotional tones
Engagement	Food safety champions and supervisors guide sessions and gather feedback to ensure relevance	Employees co-create and select artefacts, ensuring ownership, cultural integration, and shared responsibility	Employees participate through interviews and focus groups; leadership engages by interpreting and acting on emotional insights
Resources	Printing and digital access; set-aside employee time for training and facilitation	Low-cost printing and design; leadership support to maintain clarity and consistency with organisational priorities	Budget, technical expertise, AI-based tools, and training for internal auditors; time

			investment for development and integration
Monitoring	Pre- and post-training assessments, supervisor observations, and employee feedback used to understand effectiveness	Feedback collection on artefact clarity and relevance; check-ins on placement and upkeep	Evaluation through benchmarking with existing sentiment analysis tools, feedback from employees, and review of leadership responses to identified emotions
Outcome	Enhanced understanding, fewer food safety errors, and greater inclusivity for Afrikaans-speaking employees	Ongoing reinforcement of FSC, stronger recognition, enhanced accountability, and lasting behavioural change	Deeper cultural insights, reduced bias in interpretation, improved leadership responsiveness, and stronger, more resilient FSC

6.3.5 Conclusion Stage

The findings of this research study confirmed the need for the wet condiment manufacturing organisation to adopt strategies and interventions that address the FSC barriers. To respond to these challenges, design thinking principles were adapted and used as a guiding framework to shape the proposed prototypes for the organisation. This process was integrated across four stages, each designed to translate the study's findings into practical interventions. The resulting strategies were organised into five themes: 1) Leadership and Vision, 2) Communication and Inclusion, 3) Training and Language Barriers, 4) Recognition and Motivation, and 5) Shared Culture and Engagement. The organisation is encouraged to adopt the protocols presented in Table 6.4 as practical steps toward integrating these strategies within everyday operations.

The research demonstrates that strengthening FSC cannot be achieved through once-off interventions. Instead, it requires tools and practices that resonate with the lived realities of employees. The three prototypes developed in this research study, namely 1. Translated for Food Safety, 2. Cultural Artefacts of Food Safety, and 3. Integrated Internal Audit: FSC Assessment and Sentiment Analysis, each address different but complementary aspects of culture, and together they underscore the importance of accessibility, visibility, and emotional insight in building a more conducive FSC. The third prototype, demonstrates how AI can extend internal audits beyond compliance to reveal hidden emotional dynamics, offering leaders a richer lens through which to understand organisational culture.

The presented prototypes are not intended as quick fixes or stand-alone solutions but are positioned within a broader framework that responds to persistent challenges such as limited recognition, inconsistent communication, language barriers, and the lack of visible leadership. While tailored to the wet condiment manufacturer, the prototypes are rooted in organisational culture and remain adaptable, with their practical design allowing them to evolve through ongoing feedback. The Prototype stage serves as a bridge between research and practice, offering the food industry practical, evidence-informed approaches to strengthening FSC.

Although these strategies do not represent a complete set of solutions, they offer a foundation from which deeper research and refinement can grow. The design thinking stage served as a bridge between research and practice, transforming analytical findings into actionable strategies for strengthening FSC. A central strength of this stage was its originality and adaptability, translating evidence into human-centred prototypes that respond directly to organisational challenges. The integration of empathy, observation, and collaboration within the design thinking process ensured that the resulting interventions were both practical and contextually grounded. At the same time, the research study was developed within a single organisational context and drew on insights derived from secondary data. Moreover, the prototypes were not implemented within the operational environment, and as such, their long-term feasibility and impact could not be evaluated within the scope of this research study. These limitations, however, do not reduce the value of the process; rather, they position the prototypes as adaptable tools that can be refined and tested in future research or applied in similar food manufacturing settings.

Future studies can explore their feasibility and practical application, ensuring that they contribute purposefully to both academic and industry practice. Collectively, these prototypes demonstrate how FSC may be strengthened by making it more accessible to employees, more visible within organisational routines, and more responsive to the emotions that shape daily practice.

CONCLUSION

This chapter applied an adapted design thinking framework to develop practical interventions that reinforce FSC within the wet condiment manufacturing context. The process combined creativity, empathy, and reflection to translate analytical insights into actions that could be applied in daily operations. The progression revealed that sustainable cultural progress relies less on compliance than on collective understanding, trust, and participation. By encouraging collaboration and reflection, design thinking fostered a sense of ownership and demonstrated that lasting improvement often begins with small, deliberate actions that invite engagement and

shared learning. Overall, the outcomes demonstrate how a structured, yet human-centred approach can transform systematic insights into purposeful and contextually relevant practice. The interventions developed through this process provide a foundation for strengthening shared responsibility, enhancing awareness, and embedding food safety as a visible and lived organisational value.

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CHAPTER 7:

Conclusion

7.1 INTRODUCTION

This research study aimed to explore the barriers that shape the food safety culture (FSC) maturity within a wet condiment manufacturing organisation. From these insights, three interconnected prototypes were developed by drawing on the Stanford's design thinking model, each intended to translate challenges into practical opportunities for change. Rather than offering prescriptive solutions, the prototypes invite both the organisation and the broader food sector to pause, reflect, and reconsider how food safety is lived and practiced in everyday routines. Through this approach, the foundations of food safety are strengthened, the possibility of outbreaks reduced, and the overarching goal of safeguarding consumer health advanced. The research study is concluded with a synthesis of the key insights, followed by reflections on contributions, the methodological choices made, the limitations, and recommendations for future research. This conclusion chapter aligns with the research study's overarching aim to examine the structural barriers shaping FSC maturity within a wet condiment manufacturing organisation and to translate these insights into practical, context-specific interventions.

7.2 SUMMATIVE REMARKS

This research study has shown that FSC within the wet condiment organisation reflects the interplay of technical systems, organisational practices, and human behaviours, with both strengths and barriers shaping its maturity. These reflections integrate insights from the narrative review (Chapter 3), the quantitative analysis (Chapter 4), the qualitative explorations (Chapter 5), and the design thinking prototypes (Chapter 6), offering a consolidated perspective on how FSC is experienced and where it may be strengthened. In addressing the research aim, this section consolidates how each objective was met, evaluating food safety assurance practices, assessing cultural processes, integrating mixed methods findings, and applying design thinking principles to develop an integrated model for strengthening FSC.

The narrative review confirmed that food safety is acknowledged as a public health and economic priority, yet regulatory processes remain fragmented, especially in developing contexts where systemic barriers persist. Global frameworks such as HACCP, Codex, and ISO

22000 have shaped industry practice; however, recurring foodborne illness outbreaks underscore that compliance alone does not ensure consumer protection (Wu & Wallace, 2025). Within the condiment sector which is particularly susceptible to microbial, chemical, and supply chain risks, this recognition is especially significant. The review also revealed a fragmented body of knowledge, with limited scholarly and industry focus on wet condiment manufacturing in the South Africa context (Spence, 2018). By highlighting these shortcomings, the review established the rationale for positioning FSC at the centre of this research study.

This evaluation established a baseline understanding of food safety assurance practices within the wet condiment manufacturing organisation, forming the foundation from which underlying cultural insights gradually came to light. The quantitative findings suggested that while employees aligned with the organisation's vision of food safety, their commitment was not consistently reinforced through leadership practices, communication, or recognition. Compliance systems were sustained and largely effective, but motivation and empowerment were not equally integrated across employee responses, highlighting the difference between individual accountability and organisational support. The qualitative analysis extended this perspective, capturing employees' lived experiences of perceived inequity, communication breakdowns, ineffective supervision, and limited recognition. Observational findings validated these insights, revealing language barriers, gaps in training effectiveness, and inconsistencies between documented procedures and daily practice. Together, these findings showed that cultural barriers were not abstract concepts but tangible realities shaping trust, engagement, and accountability.

Across the datasets, leadership visibility and communication channels consistently emerged as pivotal but uneven, resonating with broader literature that links weak supervisory engagement and poor communication with global food safety failures (Pai *et al.*, 2024). Leadership intent was evident at a strategic level but not consistently carried through into daily practices, creating a disconnect between organisational commitment and employees' everyday realities. Overall, the summative reflections confirm that FSC maturity in this organisation is shaped as much by

human relationships and lived practices as by formal compliance systems. These insights lay the foundation for the recommendations that follow, where leadership visibility, inclusivity, and innovation are positioned as entry points for strengthening cultural resilience.

Collectively, these reflections address the research questions by identifying the key barriers shaping FSC, the influence of leadership and communication, and the related factors that either limit or strengthen resilience within the organisation.

7.3 CONTRIBUTION TO THE BODY OF KNOWLEDGE

This study contributes to the broader body of knowledge by extending theoretical perspectives on FSC to an under-explored sector, such as wet condiment manufacturing in South Africa. By situating FSC within this specific context, the study demonstrates how cultural and operational dynamics manifest differently outside the traditional focus of food safety research. The findings indicate that FSC should be understood as a context-sensitive construct shaped by regulatory environments, organisational structures, and socio-cultural conditions.

In addressing the second research objective, the study advances theoretical understanding by illustrating how leadership, communication, and inclusivity operate within sector-specific constraints. The qualitative findings position FSC as a relational phenomenon emerging through interactions between formal systems and lived organisational experience. While existing literature emphasises leadership and communication as central drivers of FSC resilience (Frankish *et al.*, 2021), this research study extends those perspectives by examining how these dimensions unfold within a specialised manufacturing environment. Rather than redefining FSC, the research study refines the conceptual interpretation by demonstrating how contextual pressures influence its expression. In doing so, it strengthens scholarly understanding of FSC as dynamic, relational, and embedded within organisational practice.

7.4 ADVANCING METHODOLOGICAL APPROACHES

The findings highlight the value of combining mixed methods with design thinking to investigate and address FSC. Drawing on secondary data, the research study integrated a quantitative survey with qualitative interviews, focus groups, and an observational assessment. This triangulated approach provided both breadth and depth, offering measurable indicators of FSC while also generating contextual insights into how those indicators were observed in the operational setting. The observational findings were particularly valuable, revealing subtle inconsistencies between formal systems and everyday routines; nuances that might have remained unseen through a single methodological lens. This section addresses the third research objective by showing how mixed methods and secondary data analysis were combined to generate both measurable and interpretive insights into the maturity of FSC.

Furthermore, the research study also advanced methodological practice by adapting design thinking as a framework that translated quantitative and qualitative findings into innovative interventions. Through the stages of Empathise, Define, Ideate, Prototype, and Conclusion, complex organisational barriers were reframed into practical, context-specific solutions. This approach also opened space for novel methodological experimentation, particularly in considering how AI and digital tools might complement traditional qualitative insights. Together, these methodological choices offer a model for future research that aims not only to identify cultural barriers but also to design, test, and refine interventions supporting the development of resilient FSC. Moreover, the methodological contribution extends beyond the single case study, demonstrating how mixed methods and design thinking together can support both theory-building and practical innovation in the field of FSC.

7.5 OVERALL LIMITATION OF THE STUDY

A primary limitation of this research study relates to its single case study design, which centred on one wet condiment manufacturing organisation in the Western Cape, South Africa. This approach enabled an in-depth exploration of FSC and provided rich contextual insights; however, it limits the extent to which findings can be transferred to the wider condiment

industry or the broader food sector. Condiment manufacturing is inherently diverse, encompassing a range of products and processes, and different facilities may encounter different regulatory, infrastructural, or cultural challenges. The insights generated here should therefore be regarded as sector-specific, offering depth of understanding rather than broad representativeness.

A second limitation stems from the scope of the quantitative, qualitative, and observational analyses. While the datasets were extensive and generated valuable insights, they did not capture additional dimensions such as specific leadership styles or individual employee perspectives beyond what was available in the datasets. Although sound thematic and statistical methods were applied, opportunities to elaborate on emerging themes were necessarily limited by the secondary nature of the data. Another limitation related to the boundaries of methodological application. While the design thinking process yielded relevant and practical prototypes, their implementation and evaluation fell outside the scope of this research study. This opens opportunities for future studies to examine their effectiveness, feasibility, and sustainability within real-world manufacturing environments. The demographic and contextual profile of employees also introduced constraints: language diversity, socio-economic differences, and varying levels of formal education influenced how FSC was understood and implemented within the organisation. While these factors were central to identifying cultural barriers, they also complicate direct comparison with other sectors or regions. Consequently, the findings may be more reflective of the specific realities of South African manufacturing than of global food systems, requiring awareness in considering their broader applicability.

Acknowledging these limitations does not reduce the contribution of the research study. Instead, it reinforces the need to position findings within their setting and to recognise FSC as an adaptive construct shaped by context. In parallel, the limitations provide a platform for further research, pointing to areas where future investigation could extend, adapt, and test the insights generated in this research study. By applying the design thinking framework, the

research study achieved its fourth objective, translating empirical findings into innovative, context-specific interventions aimed at supporting long-term cultural improvement.

7.6 RECOMMENDATIONS

Building on the integrated findings and aligned with the research study's overall aim and final research question, these recommendations validate how design thinking can be applied in practice to strengthen FSC.

7.6.1 Recommendations for the Wet Condiment Manufacturer

The manufacturing of safe food forms the foundation for protecting consumers and maintaining trust in the food system (Wu & Wallace, 2025). Within the wet condiment sector, and in the organisation studied, this responsibility extends beyond technical compliance to the development of a strong and resilient FSC. The recommendations that follow are therefore informed by design thinking principles, linking employee realities with creative and practical strategies that hold relevance not only for the studied organisation but for the wider food sector as well.

Strengthening FSC begins with leadership that is visible, inclusive, and accountable. Building resilience requires that managers and supervisors receive targeted support and development, enabling them to model organisational values consistently, communicate expectations with transparency, and recognise contributions in a fair and meaningful way. This is particularly important for frontline employees, where communication gaps and limited recognition were most apparent. While these leadership practices emerged from a specific organisational setting, they point to a wider need across the sector for greater visibility and appreciation as key drivers of cultural maturity. Language also plays a critical role in this process. In the South African context, where many languages are represented in the workforce, the strong presence of Afrikaans among frontline employees underscores the value of bilingual and visually engaging training materials that make information clear, inclusive, and accessible to all. These resources help make FSC expectations understandable and relevant to everyday work, ensuring that

guidance connects purposefully with how individuals perform their tasks. Additionally, they offer an important reminder for multilingual environments, where clear and inclusive communication supports both consistency and understanding across teams. Likewise, training should shift from top-down communication to more participatory formats that encourage collaboration, inclusion, and shared reflection on practical challenges. Together, these leadership and communication practices show how the research study's findings respond to the research questions concerning the influence of top management and the role of supervisors in maintaining and strengthening FSC.

Additionally, the use of cultural artefacts provides a practical way to integrate FSC within everyday routines. Posters, recognition boards, and infographics that are co-created with employees can act as visible reminders linking formal policies to daily practice. These artefacts strengthen accountability on the production floor and make the organisation's food safety values more tangible. On a broader level, they show how low-cost and visible cues can translate abstract principles into shared, consistent behaviours. Internal audit frameworks should similarly be expanded to include FSC themes such as communication, empowerment, accountability, and leadership visibility. Embedding these elements within organisational systems helps balance the focus on technical compliance with the growth of cultural maturity, while reinforcing credibility and consistency across the wet condiment sector.

Looking ahead, AI-enabled sentiment analysis presents an opportunity to broaden internal audit systems by capturing cultural and emotional dimensions alongside technical findings, opening new possibilities for sector-wide assurance practices. The recommendations outlined here offer a pathway for the organisation under study to cultivate a more resilient FSC, while also providing insights relevant to the broader industry. Leadership development, inclusive communication, bilingual training, cultural artefacts, and strengthened internal audits should not be viewed as isolated measures but as interconnected practices that reinforce one another. When applied collectively, they form a continuous cycle in which leaders set expectations, training builds understanding, artefacts make values visible, audits offer feedback, and recognition sustains

motivation. By taking this approach, food safety becomes not only a matter of regulation but a lived, shared commitment; one that the findings from this research study suggest can be adapted and scaled across the condiment sector.

The three design thinking prototypes: Translated for Food Safety, Cultural Artefacts of Food Safety, and Integrated Internal Audit with Sentiment Analysis form the foundation of these recommendations, offering practical pathways for organisational learning and long-term cultural transformation.

7.6.2 Recommendation for Future Research

Food safety will remain a constant priority as global food systems face new risks, changing regulations, and varying cultural contexts. This makes it essential for research to continue advancing, not only by consolidating what is already known but also by exploring new ways of understanding and strengthening FSC (da Cunha *et al.*, 2025). Future research should therefore test, refine, and extend the insights developed in this research study, contributing to more resilient and adaptive practices across the wet condiment sector.

A natural next step is to test the practical application of the prototypes introduced in this research study, by piloting them within real manufacturing environments. Such work would allow for evaluation of their effectiveness, feasibility, and sustainability, while also clarifying how employees engage with them emotionally and behaviourally over time. Comparative studies across sectors such as meat, dairy, or ready-to-eat foods would expand the understanding of which elements of FSC are context-specific and which are transferable across industries. Furthermore, there is scope to expand research into regions with differing regulatory and socio-economic environments to explore how linguistic diversity, resource limitations, and socio-economic pressures shape FSC maturity, guiding the development of inclusive and adaptable approaches.

This research study also shows the potential of integrating sentiment analysis within internal audit processes, providing leadership with insights into the emotional and behavioural dimensions of FSC that technical compliance alone may not capture. Further research could assess how predictive models perform in practice, how digital tools integrate with existing systems, and how employees experience automated assessment frameworks. Finally, longitudinal studies would be valuable in capturing how FSC shifts over time with leadership changes, organisational restructuring, or regulatory improvements, offering evidence to design interventions that remain adaptive and relevant to changing conditions.

7.6.3 Supporting the Evolution of Food Safety Certification Frameworks

The study provides an in-depth perspective on the narratives related to the condiment industry, that should be helpful for future policy and regulatory progression and updates, especially related to FSC standards such as FSSC 22000 v6 and BRC. Such information will be invaluable in the development of annexures that articulates with and responds to specific industries.

CONCLUDING REMARKS

Food manufacturers carry not only the responsibility but also the capacity to build and sustain resilient food safety cultures. This responsibility extends beyond formal compliance and operational systems, reaching into the everyday practices, values, and relationships through which food safety is lived and experienced within organisations. A resilient FSC is visible when safe food is produced consistently, employees act with confidence and accountability, and consumers remain protected within an increasingly complex and demanding food system. By achieving the stated aim and fulfilling each research objective, this research study provides a comprehensive understanding of how structural barriers, leadership behaviours, and contextual interactions influence the resilience of FSC within the wet condiment manufacturing sector.

The future of food safety will depend on aligning technical assurance with cultural transformation. When compliance frameworks are reinforced by visible leadership, meaningful employee engagement, and shared accountability, resilience becomes integrated in the

organisation's identity rather than remaining temporary or reactive. This research study contributes to that alignment by demonstrating how an under-researched sector such as wet condiment manufacturing can be reimagined through quantitative and qualitative insights, design thinking, and innovative methodological tools; approaches that speak to local realities while also addressing broader industry challenges. Ultimately, strengthening FSC is not a fixed outcome but a continual process of renewal; one that evolves alongside shifting risks, various workforces, and changing consumer expectations. Recognising food safety as both a technical requirement and a lived cultural practice ensures that resilience is not achieved once but sustained over time. Ultimately, this research study bridges the gap between investigation and application, demonstrating how evidence-based design and engaged leadership can work together to cultivate a resilient and conducive FSC.

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Appendix A Template of a Generic Data Collection Questionnaire

INSTRUCTIONS: Indicate your degree of disagreement or agreement with the listed statements on a scale from strongly disagree (0), to disagree (1), to neutral (2), to agree (3) and finally strongly agree (4) by marking with an "X" in the relevant blocks. Answer all questions irrespective of your role; should you opt not to answer, disregard and move to the next	Strongly Disagree		Neutral		Strongly Agree	
	0	1	2	3	4	
VISION (The existence of clear direction and understanding of food safety goals, expectations and targets, encouraged by ethical, logical and compassionate leadership through effective communication and across all occupational levels)						
Food safety is important to our organisation						
Our organisation has capable and approachable leadership						
Our leaders and managers lead by example in terms of food safety						
Food safety is important to all employees and across all levels						
I know and understand our product safety objectives and expectations						
I have an important role to play in our organisation's food safety performance						
The targets and expectations my company has of us regarding food safety are well communicated						
I am aware of policies and processes at our organisation that guide our food safety and quality commitment						
We often talk about food safety in our organisation and sections						
We are made aware of the importance of food safety through, for example discussions, notices, signage, illustrations, seminars, announcements, and/or social media						
Optional comments - please explain/motivate and allude to your responses above:						
INSPIRATION (The confidence and participation of employees on all levels to engage in food safety, facilitated through actions that create a sense of loyalty, ownership, responsibility and confidence)						
	0	1	2	3	4	
I am happy to raise apparent food safety concerns, risks and improvement opportunities						
I am free to question the way things are done and raise opposing views						
I am committed to making inputs and suggestions beyond my main functions						
I am accountable for food safety gaps in my area						
My opinions and inputs are valued and respected						
I care for our customers						
I feel part of food safety and quality decision making						
My organisation and I are loyal towards, and trust each other						
My organisation cares about its people and make them a priority						
We have a high morale and enjoyable team-spirit at work						

Optional comments - please explain/motivate and allude to your responses above:					
EMPOWERMENT (The provision of, and access to adequate and relevant training and resource provision, including knowledge and skills, infrastructure, equipment, finances and staff to enable achievement of the organisation's food safety goals and expectations)					
	0	1	2	3	4
I am eager to obtain and practice new knowledge and skills					
I have the relevant skills to do my work well and with confidence					
I am aware of the risks and dangers associated with food safety					
I know when a particular food safety incident may constitute a substantial risk					
The training we receive is adequate and effective					
I know the difference between, and importance of both food safety and quality					
Our organisation has appropriate induction programmes for new employees					
In our organisation, resources to ensure food safety are equally important amongst sections and departments					
My outfits, tools and materials are adequate to do my job well					
Faulty, defective or old equipment are replaced and maintained regularly					
Optional comments - please explain/motivate and allude to your responses above:					
FOOD SAFETY PERFORMANCE (Maintenance of responsive and consistent documented food safety management systems and procedures which includes relevant compliance and risk assessment instruments, monitoring, metrics, evaluation, consequences, achievements and improvement measures)					
	0	1	2	3	4
Auditors and inspectors are treated with respect and appreciation					
Compliance policies and protocols are respected and understood					
Our organisation regards regulatory and compliance inspections and audits as important and constructive					
Outcomes of inspections and audits are transparent and extensively communicated to staff					
We employ consistent, applicable and updated food safety management systems					
We keep proper and updated records of food safety processes and compliance					
Our organisation takes customer complaints relating to both product quality and safety seriously					
We widely celebrate and reward our food safety successes and achievements					

Our company is recognised and acknowledged for exceptional product safety and quality					
I am mindful of rewards and consequences relating to food safety and quality performance outcomes					
Optional comments - please explain/motivate and allude to your responses above:					
CHANGE APPETITE AND IMPROVEMENT (Our organisation's level of awareness, respect and equitability across portfolios relating to culture, race, gender and levels of authority; its agility and progressiveness to change and improve in response to emerging technological, economical, societal and organizational demands that may influence food safety performance)					
	0	1	2	3	4
I believe that change and improvement will be good for our organisation with respect to our food safety approach					
I trust our leaders to have foresight, and manage change processes responsibly, effectively and fairly					
I am informed about future plans and strategies					
I am involved, and take part in change and improvement processes					
Our organisation acknowledges and supports diversity, equality, cultures and customs					
Race, gender, political and religious orientation plays no role in how I am treated and acknowledged as a food safety and quality champion					
I see our organisation as visionary and dynamic rather than old-fashioned and stagnant					
All employees are treated equally in terms of opportunities, recognition and consequences related to their performance					
Our organisation embraces new technologies and innovations					
I see myself continuously developing and achieving my potential at this organisation					
Optional comments - please explain/motivate and allude to your responses above:					
IMPROVEMENT INTERVENTIONS (In terms of Food Safety Culture improvement initiatives, what would you like to see more of, and what do you think will be effective in your organisation?)					
Training					
Practical Demonstrations and Role-Play					
Food Safety Champions and Ambassadors					
Team Building and Social Events					
Recognition and Acknowledgement Programmes					
Inspirational Messaging and Branding					
Effective and Transparent Communication					
Leadership Visibility and Involvement					
Resources to Simplify and Improve My Work					
Rewards and Incentives					

Competitions	
Work-Life Sensitivity and Wellness Programmes	
Effective reporting and whistle blowing procedures	
Other/Optional comments and suggestions:	

Appendix B Qualitative Questionnaire used for Interviews and Focus Groups

**A CHANGE MANAGEMENT APPROACH TO ASSESSING
AND IMPROVING FOOD SAFETY CULTURE**

Food safety culture is the knowledge, attitudes, beliefs and practices shared by employees or stakeholders in the food production and service value chain with regard to providing safe and wholesome food to consumers

**ASSSSMENT INSTRUMENT B, C:
QUALITATIVE EXPOSITION THROUGH FOCUS GROUPS AND TARGETED
INTERVIEWS**

Tools:

Focus group discussions

Targeted interviews

SECTIONS B & C: QUALITATIVE EXPOSITION (Focus group and targeted interview questions to be used, as selected, by facilitator)
From a management perspective, what is the main factor/s, in your opinion, impacting your company's well-being and performance?
What is the role, in your opinion, of organisational culture, and food safety culture in particular, in the broader organisational context and success of your enterprise?
Is it necessary for your company to do things differently in terms of food safety?
If “yes”, why, what and how should change happen?
What is your role in this process?
What should the outcome of the change be and how should it be measured?
In your opinion, what will be the factors that support or hinder the process?
Would you, if you had an option, stay or leave the company, and why?
What is the single most important aspect, in your opinion, that affects your job satisfaction, and why?
How does aspects of food safety performance impact on your job satisfaction and performance?
Which five words best describe how you feel about your employer/company?
How do you ensure everyone has a common food safety perspective?
What are the food safety goals and objectives of your company?
Do you have a food safety strategy for your company?
How do you ensure you are developing your food safety knowledge and abilities?
How do you control food safety activities within the company?
What co-ordination is there for food safety activities in the company?
Do you visit all parts of the plant regularly, and what is the purpose of your visit?
How do you react if you identify someone not doing what they should in relation to food safety?
How do the factors below impact on the company and on your food safety programmes?
The national situation and political influence in the country. The example set by leadership and mentors. Supervision (style, race, gender, personality, approach, nationality, culture, language). Co-workers (personality, race, gender, personality, approach, nationality, culture, language). Downward reporting (race, gender, personality, approach, nationality, culture, language). Nature and content of your job. Company rules and regulations. Work environment (e.g. comfort, collegiality). Incentives and salary. Unions and representatives. Environment (constructive or destructive, provision of comfort breaks, available resources, equipment, education, support). Workload. Work pressure and responsibilities. Clients and consumer.

Appendix C Observational Assessment Checklist

A CHANGE MANAGEMENT APPROACH TO ASSESSING AND IMPROVING FOOD SAFETY CULTURE

ASSSSMENT INSTRUMENT: SITE AUDIT

Tools:

On site audit

SECTION D: FOOD SAFETY SUPPORT (To be completed by assessor)
Site name:
Time and date of visit:
Head of Operations:
Number of staff:
Number of staff in management positions:
Number of staff in supervisor positions:
Number of shop floor staff:
Other staff/Temporary staff
Working hours(normal)
Outsourced activities
Process description
Organisation chart
Qualification requirements for shopfloor
Qualification requirements for food safety team leader
Food safety team

FSMS PERFORMANCE (Desk-top evaluation; related to direct and indirect food handlers on various levels as well as management)	Score/ 5	Total %
Structure of the food safety management system documentation		
Accessibility		
Format		
Ease of use		
Creation process		
Level of engagement and reference during walkabouts		
		/25
Communication for food safety		
Mechanisms		
Two way		
Evidence of this		
Effectiveness review		
Co-ordination of messaging		
Initiator		
Meetings – flow of information		
		/35
Rewards schemes		
Is there one?		
Link to food safety objectives		
Reaction to rewards systems		
HR involvement		
Previous successes		
Evidence of the programme		
		/30
Risk management		
Identification of significant risks – method, sharing of information		
Level of understanding of these risks		
Communication to all levels		
Translation into expectations and behaviours		
Methods of reviewing risks – frequencies, capturing information, sharing		
		/25
Control of cross contamination practices		
Identification of risks		
Effective controls		
Understanding of controls		
Engagement with controls		
		/20
Infrastructure		
Layout and flow designed for engagement		
Input from staff		
How do you manage a modification – who is involved?		
Ergonomics – study and implementation		
Cleaning processes – ease and effectiveness measurements for engagement, verification and communication of results, actions taken and staff involvement, awareness of colour coding and implementation of this		

Personal hygiene facilities – design, use, location, engagement, swabs, communication of results		
Jewellery and personal effects policy - staff engagement, dealing with non-conformances		
Medical policy and staff engagement in this. Policy for sick leave		
Clothing – use, uniform, issuing of this – number of sets, laundry responsibilities, used for team building		
Staff facilities – design, location, engagement, care of employees		
		/75
Employee induction		
Food safety focus, when is this done?		
Attend induction as an observer, review the feedback records		
Effectiveness		/15
Employee hygiene training and records		
Frequency		
Material		
Assessment process		
Results		
Feedback on the process		
Trainers		
Attend the training		
Other types of training?		
Investment in people		
Reaction to training		/50
Control of waste – facilities, location, awareness of risks		
Glass breakage procedures		/10
Control of allergens		
Awareness and implementation		
Separate utensils		
Training		
Colour coding		
Notices		
Training		
Managing the impossible?		/35
Stock rotation in fridge, freezers and dry stores		
Date coding		
Procedure for shelf lives		
FIFO/FEFO		
Awareness and understanding		
Location		
Maintenance		
Protective clothing		/35
Records		

Completion		
Engagement		
Understanding		
Food samples and retention samples		/20
Complaint procedures		
Awareness of complaints, involvement in corrective action		
Food illness complaints		
Tracking		
Objectives		
Reaction to complaint		
Tone of communications internally and externally		
Customer satisfaction surveys		
Action plans related to these?		/40
Recipe controls		
Adherence to SOPs		
Awareness of the requirements		
Implementation		
Concerns and engagement		/20
Internal audits		
Frequency		
Corrective action		
Reaction to		
Involvement in corrective action		/20
External audits		
Awareness of		
Planning for		
Obstructive auditee behaviours		
Involvement in corrective action		/20
Food safety team meetings/toolbox talks		
Frequency		
Minutes		
Processes defined for communication – shifts		
Effectiveness of this communication		/20
Handling non-conformances		
How is this done, involvement of staff		
On the floor		
Authority to stop the line		
What are problems? Who are these reported to? Feedback		
What process is followed?		
Suggestions?		/30
Food safety technology systems		
How are records kept?		

Manual/electronic		
Review of trends		
How are staff involved?		/20
Food safety policy		
What does this mean?		
How is it lived?		/10
Suppliers and food safety		
Tone of communication		
Processes used to integrate them		/10
Subcontractors		
Requirements		
Tone of communication		/10
Regulators		
Knowledge of requirements		
Reaction to inspections		
Staff made aware of results		
Tone of reaction		
Fines etc.		
Illegal practices observed		/30
Top management meetings and involvement		
How		
Frequency		
Attendance and records		
Actions taken		/20
SCORE		/625

Appendix D List of Themes and Codes Identified in the Interview Data

Theme	Codes
Communication	Internal communication; Clarity of instruction; Feedback flow; Cross-departmental information sharing; Transparency
Responsibility and Accountability	Ownership of tasks; Personal responsibility; Follow-through; Oversight; Role clarity
Operational Flow and Food Safety Risk	Workflow disruptions; Risk awareness; Compliance with cleaning procedures; Equipment reliability
Equitability, Workload, and Incentives	Workload distribution; Fairness in reward systems; Bias or favouritism; Incentive recognition
Recognition, Appreciation, and Consequences	Acknowledgement; Feedback; Performance consequences; Reward fairness
Respect, Acknowledgement, and Trust	Mutual respect; Professional conduct; Inclusion; Interpersonal trust
Lines of Authority	Hierarchical clarity; Decision-making; Chain of command; Reporting structures
Training and Skills	Access to training; Language barriers in training materials; Practical competence; Knowledge transfer
Resources	Equipment condition; Availability of materials; Maintenance; Resource adequacy
Food Safety Objectives and Strategy	Awareness of food safety goals; Policy communication; Alignment with performance targets; Measurable objectives
Functioning as an Effective Team and Egos	Collaboration; Conflict; Power dynamics; Team cohesion
Leadership	Visibility; Approachability; Engagement; Support; Strategic direction

Appendix E List of Themes and Codes Identified in the Focus Group Data

Theme	Codes
Communication	Internal communication; clarity of instruction; feedback flow; cross-departmental information sharing; transparency
Responsibility and Accountability	Ownership of tasks; personal responsibility; follow-through; oversight; role clarity
Operational Flow and Food Safety Risk	Workflow disruptions; risk awareness; compliance with cleaning procedures; equipment reliability
Equitability, Workload, and Incentives	Workload distribution; fairness in reward systems; bias or favouritism; incentive recognition
Recognition, Appreciation, and Consequences	Acknowledgement; feedback; performance consequences; reward fairness
Respect, Acknowledgement, and Trust	Mutual respect; professional conduct; inclusion; interpersonal trust
Lines of Authority	Hierarchical clarity; decision-making; chain of command; reporting structures
Training and Skills	Access to training; language barriers in training materials; practical competence; knowledge transfer
Resources	Equipment condition; availability of materials; maintenance; resource adequacy
Food Safety Objectives and Strategy	Awareness of food safety goals; policy communication; alignment with performance targets; measurable objectives
Functioning as an Effective Team / Egos	Collaboration; conflict; power dynamics; team cohesion
Leadership	Visibility; approachability; engagement; support; strategic direction

Appendix F List of Themes and Codes from Observational Data in the Consolidated Report

Theme	Codes
Communication	Language barriers; visibility of signage; use of visual aids; clarity of documentation; feedback flow
Responsibility and Accountability	Oversight; follow-through; enforcement of corrective actions; ownership of safety tasks
Operational Flow and Food Safety Risk	Workflow disruptions; cleaning and maintenance routines; process discipline; hazard control
Equitability, Workload, and Incentives	Task allocation; cross-team support; workload balance
Recognition, Appreciation, and Consequences	Feedback; reinforcement of good practice; disciplinary response
Respect, Acknowledgement, and Trust	Professional interaction; collaboration; mutual support
Lines of Authority	Supervisory presence; hierarchical clarity; on-site decision-making
Training and Skills	Application of training; procedural understanding; competence gaps
Resources	Equipment maintenance; tool availability; facility condition

Appendix G GHREC Ethical Approval



GENERAL/HUMAN RESEARCH ETHICS COMMITTEE (GHREC)

Registration Number: REC-112922-058

12-May-2025

Dear Ms Monique Visser

Application Approved

Research Project Title:

FOOD SAFETY CULTURE AND LEADERSHIP: A MIXED-METHODS EXPLORATION OF A PROMINENT WET CONDIMENT MANUFACTURER IN THE WESTERN CAPE

Ethical Clearance number:

UFS-HSD2024/1169

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted via an Amendment on RIMS to the ethics office to ensure ethical transparency. Furthermore, you are requested to submit a Final Report on RIMS for your study/research project to the ethics office once the project has concluded. Should you require more time than the allotted 12 months to complete this research, please apply for an extension by submitting a Continuation/Report on RIMS. Thank you for submitting your proposal for ethical clearance. We wish you success with your research.

Yours sincerely,



Dr Tatenda Marange
Chairperson: General/Human Research Ethics Committee

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Appendix H Consent Letter: Food Safety Culture Solutions SA



To: Ethics Committee

From: Mrs Adele Krogh: Former Director - Food Safety Culture Solutions SA

Date: 17 January 2025

RE: Confirmation of commercial intervention to be utilised as secondary data towards postgraduate studies: Candidate M Visser

Dear Sir/Madam,

As Former Director of the company Food Safety Culture Solutions SA, at the time of the mentioned commercial intervention at Montagu Foods in the Western Cape, kindly find below a synopsis of the methods applied, to inform the ethical approval process. The project constituted a consultative project paid for by the client, Montagu Foods, responsive to supplier compliance standards as required by industry clients including wholesale, retail and foodservice. A comprehensive industry report was presented, accompanied by feedback sessions to the client.

Clearance and authorization

In South Africa, formal ethical clearance is not required when conducting consultative work in industry in terms of assessments and surveys; only the relevant approvals and consent should be provided by the designated line management. The latter was formally received from the Montagu Foods Management prior to the commercial intervention and was confirmed for academic and scientific use as confirmed by the study supervisor (Prof JFR Lues) with the current CEO (Ingrid Uys). Aligned with assessment best practice, all interactions with staff and respondents were clearly indicated to be voluntary and anonymous, and in conformance with the POPIA. The Human Resources (HR) department informed the consent process, providing the purpose and procedures of the intervention.

Data collection

The methods applied in the study are a combination literature and adapted for consultative projects commissioned by Food Safety Culture Solutions SA at the time. A number of academic and industry specialists participated in the construct formulation and review, while reflective feedback sessions to refine the themes and formulations were convened with amongst others interest groups at Michigan State University, Department of Food Toxicology and the Central University of Technology, Free State, Centre for Food Sustainability and Biotechnology. Alignment with the FSSC 22000 Version 6 Guidance Documents also guided the assessment protocols.

Consent

Aligned with the client's CEO approval as alluded to, on behalf of the data collection and reporting consultancy, I herewith authorize the use collected information for further research purposes aligned with the relevant higher education and qualification requirements.

Sincerely,

Adele Krogh



Appendix I Consent Letter: Montagu Foods



To: Prof JFR Lues
Director: Centre for Applied Food Sustainability and Biotechnology; Chair holder of the CUT-W&RSETA Research Leadership Chair in Food Safety Culture and Sustainability

From: Mrs Ingrid Uys
General Manager: Montagu Foods

Date: 1 April 2025

**RE: CONSENT TO USE COMMERCIAL INTERVENTION DATA AS SECONDARY ANALYSIS
TOWARDS POSTGRADUATE STUDIES: CANDIDATE M VISSER**

Dear Ryk,

In the mentioned capacity, we hereby provide consent to use the data collected under a food safety culture commissioned project in 2022 for research purposes, provided that the following be adhered to:

- 1) That no names or branding of Montagu Foods, nor any personal identities or affiliations of staff be reflected the research;
- 2) That the commissioning entity (Food Focus) provide confirmation of data collection best practices and authorizations.

Sincerely,



Ingrid Uys
General Manager