BUILDING BACK BETTER FOOD SYSTEMS: EXPLORING HOW EMPLOYEES LEARN ABOUT FOOD WASTE IN A FOOD PROCESSING COMPANY IN GAUTENG PROVINCE, SOUTH AFRICA

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ABSTRACT

At a time when there is increasing local and global interest in the development of sustainable food systems, it is important for food processing companies to find ways of minimising food waste. Thus, it is important to understand what knowledge employees working in the food processing industry have about food waste and how they learn about ways of minimising such waste.

This study explored how employees learn about food waste when commercially processing food at a food processing company in Gauteng Province, South Africa. The study investigated employees' knowledge about food waste, opportunities for work-based learning about food waste, how work-based learning about food waste is organised and facilitated, and challenges faced in organising and facilitating such learning. Data for the study was collected from in-person interviews and on-site observations. Process controllers, team leaders, general workers, product receivers, sustainability training coordinators, and the management team were interviewed. Work-based learning theory, and in particular, Lave and Wenger's (1991) theory of situated learning, was used to frame the analysis of the data collected.

In establishing a context for learning about food waste, it was found that employees described food waste in three ways: expired food, food spillages on the floor, and food in poor condition. These descriptions indicated that employees did not connect the issue of food waste to the food processing work that they accomplish. Unlike other sustainability issues such as food safety, health, and general waste management, there was a generally low level of awareness about food waste.

Analysis of interviews and observational data indicated that, in the food processing company studied, there are no structured ways of learning how to reduce food waste. Instead, this issue is managed through "reactive learning", where team leaders and process controllers highlight a particular issue to food processing employees after food has been wasted. Some employees expressed interest in sustained, proactive opportunities for learning about food waste.

It is evident that there is a need for structured learning opportunities about food waste for employees working in the food processing company studied and for greater awareness of the implications of food waste on both employees and employers.

DECLARATION

I, Nesengani Elelwani Clinton (2619760), declare that the research project hereby submitted to the University of the Witwatersrand for the Master of Education in Education and Work has not been previously submitted by me for a degree at any other university and is my own work in design and execution, and that all material contained herein has been fully acknowledged.

Signature:  Date: 05.10.2023

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DEDICATION

I dedicate this work to the Lord, without whom it would not have been possible to complete this research paper. I have witnessed His faithfulness in providing for my needs every step of the way and in leading me into experiences far better than I could have imagined. Whatever I have learnt, and whatever this effort has produced are by His grace alone.

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DLRAD	Department of Land Reform and Agricultural Development
IDC	Industrial Development Corporation
NDA	Non-Disclosure Agreement
NPD	New Product Development
SDG	Sustainable Development Goals
SHEQ	Safety, Health, Environment, and Quality
UN	United Nations

CHAPTER 1: A CONTEXTUAL INTRODUCTION

1.1 Background and introduction to the study

The chapter provides the background and introduction to the study, covering and introducing issues that the study attempts to problematise and address. Furthermore, it covers the research scope, including the main research question, sub-questions, and the significance of the study.

The study addresses an issue related to food waste by exploring how employees learn about food waste in a food processing company in Gauteng province, South Africa. Nationally, it is estimated that South Africa generates 10.3 million tonne of food waste every year, accounting for 40% of the food for consumption being wasted (Oelofse et al. 2021). This estimate confirms the claim by Buzby and Hyman (2012) that food waste appears to be high in both developed and developing countries, and that South Africa is not an exception to this. Such food wastage is ethically unacceptable, as there is ample evidence that at household and intrahousehold levels there exists high levels of hunger, where the majority of the poor are deemed to be chronically food insecure in South Africa (Aliber, 2009; Pereira & Drimie, 2016).

Food waste varies along the food chain with an estimated 49% of food wasted in the processing stage (Oeloftse et al. 2021; Ramukhwatho et al. 2021; Wilson, 2021). While the South African food processing industry is responsible for wasting a substantial amount of food, the Industrial Development Corporation (IDC) (2016) indicates that, on the positive side, the industry plays an important role in ensuring food security and creating jobs. The industry accounted for 38% of employment in the total manufacturing sector in 2020 (Statistics South Africa, 2021, as cited in the Department of Land Reform and Agricultural Development (DLRAD), 2021).

As much as food waste is a global issue, there continues to be no agreed definition of food waste in the literature, as the concept of food waste means different things to different people and societies. According to Betz et al. (2015); Papargyropoulou et al. (2016); and Pirani and Arafat (2016), to date there has been little agreement on how foodservice professionals and researchers define food waste. However, much work has been done by the World Resources Institute (WRI) and the United Nation's Food and Agriculture Organisation (FAO) to develop standardardised food loss and waste terminology, and reporting protocols. These are now widely adopted. Lipinski et al. (2013) (of the WRI) defines food waste as food spillages in the food processing plant resulting in food waste before food products reach the final consumer.

Food waste refers to food losses and contaminations during the food processing stage that result in a loss of food quality (Parfitt et al. 2010). Within the South African context, the Department of Environment, Forestry and Fisheries (DEFF) and Council for Scientific and Industrial Research (CSIR) (2019) define food waste as inedible components of food that are removed from the food supply chain to be disposed. Edible and inedible parts of food that is disposed of by households into the municipal bin, fed to animals, or disposed of in any manner other than in the municipal bin refers to food waste (Oelofse et al. 2018).

Food waste has economic, social, and environmental impacts (Hanson & Mitchell, 2017; Oelofse & Nahman, 2013). In promoting a world in which there is zero hunger, and to ensure sustainable production and consumption the United Nations (UN) set Sustainable Development Goal (SDG) target 12.3 to halve per capita global food waste at the retail and consumer levels and reduce food losses along the production and supply chains, including post-harvest losses by 2030 (United Nations, 2016). This target has been adopted by the Consumer Goods Council of South Africa's (CGCSA) Food Loss and Waste Initiative, against which South African retailers and manufacturers commit to this target.

This study considers all the food that does not leave the case processing plant for human consumption as food waste. There are several ways in which food waste can be studied and understood (Salman, 2021). One way is by assessing the knowledge and skills that employees working in food processing companies have about food waste (Department of Environment, Forestry and Fisheries and Council for Scientific and Industrial Research, 2019). This raises the need to assess employees` knowledge of food waste, specifically in the workplace, as well as how they acquire or have acquired this knowledge. Furthermore, companies are increasingly pressured by stakeholders to engage in sustainable production practices (Moon & Orlitzky, 2011). In order to achieve these sustainability practices, management must be able to determine how their organisations can become environmentally responsible and economically sustainable (Nagyová et al. 2016). This in turn suggests the need to investigate how, why, and what employees in the food processing industry learn about food waste (or do not learn) in the workplace.

1.2 Problem statement

Given the concerns about food waste in South Africa (Department of Environment, Forestry and Fisheries and Council for Scientific and Industrial Research, 2019; Oelofse et al. 2018; 2021; Oelofse and Nahman, 2013), such food waste should be reduced to enable a transition to a more sustainable food system, in which people are more food secure (Salman, 2021). At a provincial level, Le Roux et al. (2018) discovered that substantial amounts of food is wasted in the processing stage of the Gauteng food chain and that efforts to reduce food waste should be focused on this stage. Educating employees about food waste becomes an important educational priority (Samoggia & Beyhan, 2022). One way of doing this would be to adopt Matthews' (1999) work-based learning idea, which states that every attempt to improve an organisation's efficiency, production, profit, or quality must begin with studying the structure of the workplace and determining how learning happens. Such a work-based learning idea is supported by the Department of Environment, Forestry and Fisheries and Council for Scientific and Industrial Research (2019) who in their guide on how to reduce food waste indicate that it is important to provide education, training and skills on how to prepare different food products to reduce food waste. Therefore, this study investigates work-based learning opportunities about food waste provided to employees at work. These include employees working along the food processing stage on how and what they learn about food waste during the commercial processing of food. However, part of literature indicate that not much is known about employees learning about food waste in the South African context, as it mainly focuses on household, consumer, and hospitality sectors (Dubey et al. 2020; Pirani & Arafat, 2016; Smith & Landry, 2021).

1.3 Research scope

This study investigates the nature of employees` learning about food waste at a commercial food processing company in Gauteng Province, South Africa. The investigation focuses on employees` current knowledge about food waste — what, how, and why employees learn about food waste — and challenges faced in food processing companies.

1.4 Research questions

The research questions were formulated to provide information on how, what, and why employees learn about food waste in a food processing company. The assumption underlying the questions was that finding out how, what, and why employees learn about food waste when

commercially processing food would provide knowledge about what they know and do not know about food waste. The researcher was mainly interested in the work-based learning opportunities to learn about food waste. The research questions, divided into the main and sub-questions, are as follows:

1.4.1 Main research question

How do employees learn about food waste during the commercial processing of food?

1.4.2 Sub-questions

i) What is the current knowledge of employees about food waste?

ii) What type(s) of work-based learning opportunities exist about food wastage within the workplace?

iii) How is work-based learning about food waste organised and facilitated?

iv) What are the challenges experienced in organising and facilitating work-based learning about food wastage for employees?

1.5 Significance of the research study

The importance and significance of this study are foregrounded by the research questions. Answers to the research questions are what will make this study significant and important to contribute to the learning field of sustainability education.

This study was underpinned by the idea that teaching employees how to reduce food waste can contribute towards food sustainability. Food waste reductions in the food value chain lead to improvements in the sustainability of the entire food service sector (Papargyropoulou et al. 2016). If employees learn about food waste, they are likely to change their behaviour for the better and save food from being wasted.

Finding out what work-based learning opportunities about food waste exist will also provide knowledge about what is lacking in learning about food waste. Since much is not known about how employees in Gauteng food processing companies learn to reduce food waste, this research will help in finding out how this happens. If indeed it does, other researchers can also use this study when discussing work-based learning about food waste and its related sustainability concepts, such as food sustainability, environmental education, food safety, health, etc.

1.6 Conclusion

This chapter has provided a background to the study by outlining the extent of food waste in South Africa and Gauteng Province. It has provided a brief introduction to learning about food waste and how such learning could play an important role in the transitioning to a food system that is sustainable. The problem that the study is addressing is outlined in this chapter together with research questions. The chapter has concluded with the significance of addressing the problem and the contribution that the study aims to make.

1.7 Structure of the research report

This thesis is made up of five chapters:

Chapter 1 is an introduction to food waste and the learning about food waste in South Africa. This introductory chapter presents a general overview of what the rest of the study is about and the various elements that will be covered in the subsequent chapters.

Chapter 2 introduces the South African food processing industry. It does so by looking at the food processing workforce, their roles, skills, and knowledge, learning about food waste, and challenges faced in learning about food waste. It includes detailed literature on work-based learning and its related concepts, as well as the conceptual framework used in this, which is study-situated learning theory.

Chapter 3 offers insight into the systematic research methodology used in conducting this study. The chapter presents the data collection tools, participants, and how the data was analysed thematically. Towards the end of this chapter, I elaborate on the ethical aspects of this study, data validity, and trustworthiness.

Chapter 4 presents the data that was collected and offers preliminary findings according to different levels of analysis. Themes from the data are presented and linked to learning about food waste.

Chapter 5 brings together the findings and discusses the summary of findings. In this chapter, I show what is revealed by the data using the analysis generated from chapter 4. I also link the findings to the research questions and then to the literature presented in preceding chapters as a way of summarising the main findings of the study.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter engages with literature related to the study's questions to develop analytic insights. The first part of this chapter contextualises the study and reviews the South African food processing industry, food waste at the food processing stage in the South African and Gauteng food value chain, and the knowledge and skills in food processing companies to have a good understanding of the food processing sector. The chapter also presents a review of the extant literature on work-based learning and its associated concepts, such as workplace learning, situated learning, and learning through and at work. Broad knowledge of work-based learning is important and helpful for highlighting the theoretical concepts, learning methods, benefits, challenges, and critiques that assist in understanding learning about food waste or sustainability education.

2.2 The South African food processing industry

2.2.1 Overview of the South African food processing industry

The South African food processing industry is believed to have more forward and backward linkages within it than other manufacturing sub-sectors (Black et al. 2016). This implies that the industry is labour-intensive, which is an important factor in terms of job creation. The food processing sector employed 312 427 people in 2021 (Statistics South Africa, 2021). Of this number, 70% of the total food processing workforce were black African, with coloured and Asian employees accounting for 21% of the total food processors' employees. Chitonge (2021) argues that this is one of the reasons why the industry is believed to have the potential to make a significant contribution to economic and social transformation. Large food processing companies account for the largest share of employment in the agro-processing sector (Chisoro-Dube et al. 2019). Factors such as the usage of capital-intensive production techniques contribute to this larger share of employment by large firms. The large food processing companies that dominate the industry include Tongaat Hullet, In2food, Tiger Brands, RCL Foods, Nestle SA, Pioneer Foods, Zyl Sea Foods Company, Pan exports, Phezulu International, Johnson Trading Co.SA, Sunspray Foods (Pty) Ltd, and Cornish amongst others (Khumalo, 2022; Trade & Industrial Policy Strategies, 2021). Some of the products that these companies process include dairy, red meat, grain milling, fruit and vegetable processing, sugar milling and confectionery, and poultry (Trade & Industrial Policy Strategies, 2021).

The South African food processing industry has transitioned from being a white dominated sector to one that is inclusive of a black food processing workforce (Shafi et al. 2022). While the white food processing workforce were allowed to sell in lucrative markets during the apartheid regime, the black food processing workforce were only allowed to sell their commodities to local and regional markets such as supermarkets and general dealers (Greenberg et al. 2010). This indicates that there were some power imbalances between South African food processing workforce during the apartheid regime. With the transition from apartheid to a democratic South Africa, Greenberg et al. (2010) note that the restructuring of the apartheid food system brought about reforms in the balance of power toward the food processing workforce. These reforms enabled the inclusion of a black food processing workforce into the food system, which led to a more integrated food processing industry. As a result of the integration, there has been an increase in the number of food processing companies in the food industry post-apartheid in the country (Vermeulen et al. 2008). At the time that this study was written, there were 1800 large food processing companies in South Africa (Trade & Industrial Policy Strategies, 2021).

Beyond the transition from a white-dominated sector to a more inclusive industry, there has also been a shift from a manual to a technology-based industry within the food processing sector (Chitonge, 2021). The sector has become more technology-intensive with opportunities for skills development (Nkhonjera & Das Nair, 2018). Edwards et al. (2015), show that food processing firms have restructured their production processes away from manual and unskilled labour-intensive production towards more capital and skilled labour-intensive production, where technology is the primary driver of production. Furthermore, around 66% of companies within the Food and Beverage sector have started to produce more advanced products due to technology adoption and usage in South Africa (Allais et al. 2021). This shows that the introduction of technology is fundamental in developing a country`s human capital and enhancing productivity which can lead to increased job opportunities, and therefore economic growth.

This section has introduced two main arguments in relation to how the South African food processing industry is being shaped. The first argument is that the transition from the apartheid regime to a democratic state has shaped the industry. The second argument is that the transition from manual labour to technology use in the food processing industry has played an integral role in enhancing workforce skills and productivity. Thus, the next section considers the food processing workforce and its roles, functions, and skills in the food processing stage.

2.2.2 Food processing workforce and their skills in the food processing stage

With the knowledge of transitions in relation to the South African food processing industry, it is important to understand the roles and skills of those working within the industry. The workforce is hired by food processing companies for their set of knowledge and skills to carry out various roles and responsibilities. Examples of these roles include supervisors, operation managers, and general employees in different departments, who perform and report to plant managers on activities that are related to their operations (Vukosi, 2019). Each of these employees, has specific roles, as earlier stated and, whilst plant managers are hired to manage entire operations within production plants, Jeebhay et al. (2001) report that some of the general functions and duties performed include working with varieties of vegetables and fruits. This shows that individual roles, functions, and responsibilities vary within food processing companies.

By extension, it is important to consider the knowledge and skills that food processors require in the industry. As mentioned above, there has been a change in the knowledge and skills demanded within the industry. According to Chitonge (2021), technology has shaped the skills demanded in the industry. Thus, as a result, there has been a demand for technical knowledge and skills associated with the roles of technical instructor/trainer, machine operator, process controllers, importer and exporter expert, and product examiner required by the food processing workplace (AgriSeta, 2019).

Having outlined some of the types of food knowledge and skills of employees, the next section focuses on the challenges that they face when processing food.

2.2.3 Challenges faced by employees in the processing of food.

Chitonge (2021) claims that the South African food processing workforce continues to face several challenges when processing food. Vukosi (2019) suggests that some of the challenges faced by employees within food processing companies in Gauteng province include inappropriate communication channels, a lack of management, poor execution techniques amongst line supervisors, plant supervisors, operations managers, and employees. Failure to address these challenges has detrimental effects on the overall performance of companies. Another challenge is the production of food waste, which is an indicator of ineffective processing practices caused by working under pressure and inadequate time to reach production targets (Hailu, 2021). By implication, as employees continue with ineffective ways of processing food, it will be difficult to develop sustainable food systems (Salman, 2021). The challenge of food waste in the processing stage is a key focus of this study. Food waste varies

along the value chain with an estimated 49% wasted in the food processing stage in South African companies (Oelofse et al. 2021). In a Gauteng study, Le Roux et al. (2018) discovered that a substantial amount of food is wasted during the processing stage at the packhouse. Le Roux et al. (2018) recommended that efforts to reduce food waste should focus on this stage. Reducing food waste should not be only about designing food storage that can prolong the shelf life of food, but should also look into how and what food processors in food processing companies learn about food waste (Department of Environment, Forestry and Fisheries and Council for Scientific and Industrial Research, 2019).

Keller (2004) indicates that challenges such as those outlined above raise the need to invest in employee training and education for development within food processing companies. Education becomes an important priority and tool in finding out how and what learning takes place in food processing companies (Department of Environment, Forestry and Fisheries and Council for Scientific and Industrial Research, 2019). Drawing on Keller (2004), it is evident that training and learning are important and necessary to prepare and upskill the food processing workforce to remain resilient and responsive to any challenges that may affect the performances of food processing companies. Chisholm et al. (2009), one of the authors who provide us with the ideas that work-based learning assists in providing analytical tools and ideas to better understand the educational component in a workplace environment. Having introduced some challenges faced by the food processing workforce, the next section considers learning about food waste, as a dimension of learning (training) that must be considered in food processing companies (see Department of Environment, Forestry and Fisheries and Council for Scientific and Industrial Research, 2019).

2.2.4 Learning about food waste

Food waste education and awareness are becoming increasingly important in the food processing industry (Demirbas, 2011). Around the world, and in South Africa, the food processing industry has pledged to minimise food waste, recycle food materials, and compost organic waste (Salman, 2021). Food processing companies are doing this by using zero waste programmes to teach their employees how to minimise food waste, beginning at a micro-level and, over time, when employees perfect the learning, they become skilled in reducing food waste (Salman, 2021). South Africa has committed to reducing food waste by working with food processing companies and other stakeholders to share learnings on how to tackle food waste (Consumer Goods Council of South Africa, 2022). Within the South African context, at

the time of this study, there were few studies that focused on how learning to reduce food waste takes place in commercial food processing. Moreover, of the literature that is available, most is grey, which provides little detail. Most of the existing literature is international. An example being a Nestle in the United States of America, which, with the intention to look for new ways to reuse and recover lost food and manufacturing by-products as part of its sustainability efforts, introduced efforts to teach employees to work towards food waste reduction (Salman, 2021). The second example is the work by Billet (2001), who investigated the preferred strategies of workplace learning to reduce food waste in United Kingdom food processing companies. Billet`s (2001) first case study was conducted at HealthyLife, which has a rich history of in-house training, where employees in many areas of the plant were familiar with work-based learning programmes. The second case was Albany, which used in-house training. Overall, the study indicated that factors such as age, gender, and skills have an influence on how employees understand learning within food processing plants. Lastly, Nayak and Waterson (2017) discovered that the food processing workforce in the United Kingdom prefers a proactive learning approach to reactive learning around food waste-related issues such as food safety. According to Nayak and Waterson (2017), the food processing workforce highlighted proactive learning as an approach that develops an individual`s ability to deal with food safety issues at earlier stages and understand how to solve them in the long run. By implication, learning that is proactive will enable the food processing workforce to understand better how food issues such as food waste and safety can be dealt with during food processing. This aligns with the argument by Yiannas (2008) that reactive learning continues to be one of the most commonly used approach for teaching the food processing workforce about food-related issues.

Having discussed the nature of learning about food waste and its other related concepts such as food safety, and two ways of learning about food waste in food processing companies, now I turn to extant literature on work-based learning to gain a better understanding of learning at, learning through, situated learning and other related concepts.

2.3 Understanding work-based learning

2.3.1 Work-based learning

Different concepts have been used to describe work-based learning by various authors in the area of knowledge and skills development. For instance, authors such as Avis (2010); Boud and Symes (2002); Fenwick (2002); McCowan and Unterhalter (2015) and Sadler-Smith and Smith (2004) use the terms workplace learning and work-based learning interchangeably, with the differences and similarities not being clear. Boud and Symes (2002) define work-based learning as a form of learning that occurs on a day-to-day basis at work as employees acquire new knowledge and skills for performing tasks. Sadler-Smith and Smith (2004) define work-based learning as learning through and at work. From these definitions, it is clear that the elements in defining work-based learning are similar. Given the existing different accounts by various authors, this section acknowledges that there are other similar concepts to work-based learning, and this study will use work-based learning. This section will review what the concept entails and will use the term work-based learning.

Historically, work-based learning has been known to play an important role in bringing knowledge and action together in work-related learning environments (Flanagan et al. 2000). However, as much as work-based learning serves as an important tool in bridging knowledge and action in the workplace, Raelin (2008) notes that work-based learning does not tackle issues that are related to its pedagogy. Work-based learning provides learning and teaching between practitioners, experts, employees and their peers (Raelin, 2008). From this, it is clear that work-based learning serves as a tool to consider employees learning at work. Apart from being used as a tool for bringing knowledge and action together at work, work-based learning is also used to describe higher education programs in which the learning that takes place is carried out mainly at work, through work, and for work purposes (Garnett, 2016). Here, Garnet (2016) shows that learning processes differ and can come in different forms. From her (2016) definition, a distinction can be drawn between ‘learning for a specific activity’ and 'learning through and at work'. Based on this distinction, the next section discusses learning through and at work.

2.3.2 Learning at work

In this study, the idea of work-based learning and learning at work is accepted as a strategic necessity for many organisations and different professions (Nevalainen et al. 2018). This study

argues that professionals can learn at work and grow their knowledge and skills within organisations. Learning at work occurs through engagement in routine and non-routine problem solving influenced by a community of practice and shaped through trusted and social guidance (Raelin, 2000). The idea of learning at work is promoted by authors who take a socio-cultural approach to work-based learning, including Miettinen et al. (2009) who view it as a direct way of learning with multiple role players displaying their roles. Learning at work is a collaborative activity with teamwork which is shaped by how practices are carried out. In addition, Schön (2001) claims that using the experience from previous work to reflect on new situations is key for learning at work and claims that learning at work has much more effect than learning through formal instruction. Suwannaporn and Speece (2000) indicate that experience plays an important role in New Product Development (NPD), a key component of food production, as one of the ways for learning at work. This shows that experience is key in the development of professional skills through learning at work.

2.3.3 Learning through work

In comparison to learning at work, Schön (2001) notes that learning through work allows for knowledge to be transferred in unstructured and informal situations as new ways of increasing productivity are introduced. This shows that learning through work can increase productivity when used effectively within organisations. Scholars such as Billet (1999) and Lave and Wenger (1991) argue that when learning through work, participation is key during the learning process as employees engage under the direct or indirect guidance of experts. However, the learning activity through work participation differs according to categories of employees, with temporary, contractual, and seasonal employees not fully participating in some of the learning opportunities like full-time employees (Billett, 2001). This reveals one of the challenges of learning through work, which will be discussed in detail in Section 2.3.5. In contrast to learning through work, Scribner and Cole (1973) claim that greater knowledge and understanding of different contexts can only be produced through formal learning in a classroom setting, which is the only form of learning that promotes abstract thought (Stech, 2008).

Learning through work uses practical methods of learning where there is an expert guiding the learning. According to Billet (1999), learning opportunities used for employees to learn include learning activities, interactions, observing, and listening. These elements of learning indicate that this process of learning through practice happens collaboratively. Through his work, Billet (2001) discovered that teaching strategies such as using diagrams, modelling, questioning, and

coaching also improved learning through work. He (2001) further indicated that there were differences in the adoption and use of these teaching strategies, with several factors such as workplace goals and objectives, enterprise size and learning arrangements not fully explaining these variations. By implication, organisational factors influence learning through work.

This section has outlined learning at and through work and introduced some of the teaching methods used. In the next section, I describe these methods in more detail, and how different authors explain them and how they assist in understanding work-based learning.

2.3.4 Work-based teaching and learning methods

Work-based teaching and learning methods have evolved over time. Casey (1995) indicates that in the past, employees would learn a single trade through apprenticeship, where they would then specialise in a chosen field. However, over time, companies have transitioned to adopting a range of learning methods and strategies to meet organisational learning outcomes (Casey, 1995). Other teaching and learning methods include teamwork, interpersonal experiences, mentorship, scaffolding, instruction, stories, reflection, coaching, exploration, collaboration, demonstrations, and action projects (Messmann & Mulder, 2015; Raelin, 2008). These learning strategies indicate how learning can happen within workplace environments. Lave and Wenger (1991) suggest that employees learn through participation where the practice is only accessed by the members who are part of the practice. On the other hand, Lunce (2006) indicates that employees can learn by observing actions taken by experts and participate throughout by following instructions as members of a community. These two views of how employees learn show that participation is central to learning.

To reiterate, with the introduction of new technologies in working environments, there is a need to equip employees with the knowledge and skills to perform the functions brought by the technology (Boud et al. 2000). Barnett (2007) argues that technological devices used by employees can become channels through which work-based learning occurs. Lave and Wenger (1991) list technological tools such as computers, videos, audios, television presentations, and image processing as ways of presenting and organising workers in learning. Mclellan (1996) claims that these technological tools can be used in the workplace and help newcomers understand organisational practices.

Although approaches to work-based learning have evolved, Messmann and Mulder (2015) acknowledge that apprenticeships are still used in workplace environments to prepare

individuals for professional development on the job. In this form of learning, employees learn job-specific skills and accumulate experiences that have academic and developmental benefits (Bailey et al. 2003). This shows that work-based learning offers an opportunity to acquire knowledge that can be used beyond the working environment. Now that I have outlined ways of offering work-based learning, the next section reviews challenges in facilitating and organising work-based learning.

2.3.5 Challenges in facilitating and organising work-based learning

Challenges in organising and facilitating work-based learning include the construction of inappropriate knowledge, limited access to expertise, the reluctance of experts, and a lack of learning motivation and interest (see Beckett & Hager, 2000; Billett, 1994, 1995; Gott, 1995; E. Harris & Volet, 1996; Lave & Wenger, 1991; Moore, 1986; Scribner, 1984). In this section, I discuss the challenges in detail. I acknowledge that other challenges are faced, but in this study, I focus on:

- **Limited access to expertise**

Access to the guidance of experts is likely to be an important factor in workplace learning and limits to its availability are likely to diminish the quality of learning outcomes. For example, in a study of coal employees, Billett (1994) concluded that the teachers from the college who organised learning lacked an understanding of how work was conducted in coal mines, and this made it difficult for the employees to fully understand the teaching. This example suggests that the degree of expert guidance plays an important role in workplace learning and if is not available, the learning process is negatively affected.

- **Reluctance of experts**

Billet (1995) indicates that reluctance by experts to guide and interact with newcomers may inhibit the intended outcome of workplace learning. His (1995) view is also supported by Moore (1986), who suggests that experts may be reluctant to share their knowledge for fear of loss of status or even concerns about their own displacement by those whom they have guided and supported. However, the quality of interaction between experts and newcomers is important because, through quality interaction, newcomers gain knowledge and skills. A reluctant expert is likely to just tell and not demonstrate, as they are not interested in or fearful of sharing their knowledge (Harris & Volet, 1996).

- **Lack of learning motivation and interest**

For work-based learning to be successful, both employers and employees should be motivated and interested in organising, facilitating, and responding to it. According to Atkinson (2016), some employers have lacked the motivation to introduce work-based learning in their workplaces. One reason for this is because companies' primary goal is to maximise profits, and learning is perceived as time-consuming (Sukalova et al. 2022). By implication, even if employees might be interested in learning at work, it might be impossible for them since the employers are not motivated to adopt work-based learning. On the other hand, Beckett and Hager (2000) indicate that when work-based learning has been introduced at work, some employees find it difficult to admit that they need to learn in order to understand how practices are implemented. This suggests how an employee's attitude toward work-based learning affects whether it will be beneficial to them. Boud et al. (2000) suggest that when employees find it difficult to admit that they need to learn how to carry out practices, this reduces their motivation to learn and presents a challenge to management, improvement specialists, and trainers. As a result, this poses a challenge to the management to facilitate work-based learning (Boud et al. 2000).

This section has described how employees and employers can limit the quantity and quality of work-based learning. The following section focuses on the benefits of work-based learning, specifically on why employees learn at work.

2.3.6 Benefits of work-based learning: Why employees learn at work?

Work-based learning provides opportunities for individuals to learn from their peers and experts. Close interactions between newcomers and experts during the learning process are reported as a guiding learner solution to learning tasks (Billett, 1994; Harris & Volet, 1996). Such close interactions show that individuals who utilise the learning provided by experts benefit more from learning. According to Harris (2010), close interactions between newcomers and experts are considered important where experts are reported to provide the effective means for achieving learning tasks and goals. This close interaction can be linked to the learning of Brown et al. (1989) through modelling, coaching, and scaffolding approaches. For example, listening to and observing other employees assist new employees with the conceptualisation and approximations of workplace tasks (Billett, 1994). Such learning approaches suggest that listening and observing others when performing tasks can also provide a basis for learning and

the knowledge acquired can be easily transferable across settings in which the same practice is conducted.

Worth noting is that employees' learning purposes vary in the workplace, where they learn for different reasons. According to Boud et al. (2000), purposes of work-based learning include improving performance for the benefit of the organisation, personal development of an employee for personal growth and lifelong career, and improving learning as a social investment for citizenship. Thus, work-based learning may benefit both the individual, the company, and the society. By implication, as individuals benefit at a personal level, they can use the knowledge and skills acquired through work-based learning outside the work environment. Suwannaporn and Speece (2000) indicate that to increase learning processes, companies must continue to develop new products and processes to adapt to changing customer requirements and technology. Work-based learning is introduced for various reasons, and throughout the learning process, benefits are realised by individuals, companies and the society. Another reason for work-based learning that is gaining traction is situated learning where individuals learn about specific situations in a specific location (Anderson et al. 1996; Billett, 1994; McLellan, 1996). The next section looks at situated learning to better understand how employees learn about food waste through and at work.

2.4 Conceptual framework

2.4.1 Situated learning

This study engaged with situated learning theory to identify concepts for use in analysing data and addressing the research questions. This situated learning was first proposed by Lave and Wenger in 1991. This theoretical perspective on the nature of knowing and learning emphasises the situatedness of learning in specific environments (Barab & Plucker, 2002; Lave & Wenger, 1991). It offers new ways of conceptualising and studying learning processes in non-classroom settings (O'Brien & Battista, 2020), allowing individuals to acquire knowledge and skills to perform as they engage through legitimate peripheral participation (Lave & Wenger, 1991). The theory continues to be used to understand learning at work (Billett, 1998, 2020; Engeström, 1993, 2001; Guile & Young, 1998), and is used in this study as a theoretical lens through which to view and understand employees learning about food waste when engaged in commercially processing food.

One key feature of situated learning is collaboration during which individuals come together to interact within a community of practice (Henning, 2004). In situated learning, a community

of practice includes all the individuals sharing a common task (Lave & Wenger, 1991). Collaboration provides an opportunity to acquire collaborative, problem solving, and teamwork skills (McLellan, 1996). Some concepts associated with situated learning theory, proposed by Lave and Wenger (1991), provide useful lenses for understanding learning at and through work. These concepts include newcomers, experts, practice, legitimate peripheral participation, and mediation. Each of these concepts is used in this study and they are explained below.

- **Newcomers**

Lave and Wenger (1991) define newcomers as legitimate peripheral participants in a community of practice. Lave and Wenger (1991) definition indicate that newcomers move towards becoming full members of communities as they interact with practices and interrelate with other peers. Over time, as these individuals perfect the learning, they become full members in a community of practice.

- **Experts**

Experts and old-timers are used interchangeably in the literature on situated learning. This study will use the term expert(s), and define these as individuals who are full-time members of the community of practice (Lave & Wenger, 1991). Experts have the power to influence how and what newcomers learn in communities of practice (Fuller et al. 2005; Fuller & Unwin, 2004; Lave & Wenger, 1991). This is why Dreyfus and Dreyfus (1986) claim that experts do not follow structured rules of teaching but rather, use their experience to teach newcomers. This reveals a limitation of situated learning and suggests that the degree to which newcomers become experts is influenced by the experts leading the learning.

- **Practice**

Lave and Wenger (1991) foreground the benefits of situated learning for a practice. They indicate that a practice is only accessed by members who form part of the community. In this community of practice, there is an application and sharing of knowledge and skills led by experts (Lave & Wenger, 1991). This is why Cope et al. (2000) argue that it is through practice that newcomers learn how to interpret situations and deal with them effectively. When newcomers enter the community, they are not sufficiently knowledgeable and skilled in carrying out practices that are specific to the community, and as a result they are given tasks to complete at the periphery (Lave & Wenger, 1991). This process of giving newcomers practices

at the periphery has been termed legitimate peripheral participation (Lave & Wenger, 1991) and is considered to be a crucial aspect for successful learning and teaching between newcomers and experts.

- **Legitimate peripheral participation**

In the context of situated learning, legitimate peripheral participation is described as the concept that explains how newcomers become experienced members and eventually experts of a community of practice (Lave & Wenger, 1991). Legitimate peripheral participation provides a way to speak about the activities, identities, knowledge, practice, and relations between newcomers and experts (Lave & Wenger, 1991). It helps understand how everything happens between newcomers, peers, and their experts. Over time, newcomers move from being legitimate peripheral participants to become fulltime members of the community, through different mediation tools used in the learning (Lave & Wenger, 1991), which is the next concept to discuss.

- **Mediation**

According to Lave and Wenger (1991) mediation refers to the teaching involved in enabling a newcomer to become expert over time. Lave and Wenger (1991) indicate that several mediation tools are used in enabling newcomers to become experts. These include material and psychological tools such as pictures, posters, diagrams, and experience by experts. Experts play an important role in mediation, where they demonstrate practices to newcomers who observe through legitimate peripheral participation as they learn through work, and eventually become core participants (Abdul Rahim et al. 2009; Dreyfus & Dreyfus, 1986; Lave & Wenger, 1991). As newcomers learn at the periphery at first, they gain confidence and over time their identities change, as they perfect the learning, and become full participants of the community, termed experts.

Having discussed situated learning and its related concepts, next I explain how different scholars critique situated learning and its related concepts.

2.4.2 Critiques of situated learning and its related concepts

One of the main critiques of situated learning is the exclusion of the individual dimension of learning as the theory stipulates that learning takes place only if a person is part of a community of practice (Gergen, 1994; Illeris, 2003). This reflects that situated learning is only accessed by

individuals who form part of the practice, then all individuals who are not part of the practice cannot access the learning. Henning (2004) highlights three challenges in using situated learning. The first is that situated learning programmes are often time-consuming to institute. Participation, as a dimension of situated learning, may be time-consuming during discussions. Secondly, the success of situated learning often requires the participation of active learners who are intrinsically motivated. Thirdly, while situated learning may be suitable for many learning outcomes, it is argued that it is not the most efficient methodology for teaching information or abstract, complex concepts. Scholars such as McLellan (1996) and Ben-Ari (2005) argue that situated learning is not more of an educational or pedagogical form of teaching, because a newcomer must have a significant amount of basic and background knowledge before entering into meaningful participation in pedagogical communities of practice. This third critique shows that situated learning might not be the best learning modality in situations where learning is curriculum-based.

Fuller et al. (2005) suggest that situated learning fails to account for the effects of bringing experts from elsewhere to teach newcomers as they progress to become full members of a community of practice. This helps to understand why it is important to use existing experts within the practice community rather than bringing in experts from elsewhere. Regarding legitimate peripheral participation, situated learning does not explain in depth how the learning of experts differs from that of newcomers (Fuller et al. 2005). Here Fuller et al. (2005) show that, as much as situated learning explains how newcomers learn in a community of practice, it does not explain how experts learn. There are also power imbalances that exist in situated learning, where experts use their power to control the learning resources (Fuller et al. 2005). This is also critiqued by Fuller and Unwin (2004), who argue that newcomers, who are restricted to learning practices and to interacting with other peers are more likely to become narrow instead of becoming broad experts as they become full members of communities. By implication, newcomers may only learn about certain aspects of the practice and have limited knowledge about others.

I acknowledge the critiques made on situated learning and its concepts; however, I build on these to explore how employees learn how to reduce food waste at and through work when they commercially process food.

2.4.3 Relevance of the identified situated learning concepts

Despite some possible limitations of situated learning, the identified concepts provide lenses to better understand the learning, interrelationships, and guide in collecting and analysing data on employees learning to reduce food waste when commercially processing food. The concept, practice is useful in understanding if learning about food waste happens, or not in the food processing company. The concept, experts is useful in identifying individuals who have been working in the food processing plant for more than five years. are those who have been working in the food processing plant for more than five years. The concept, newcomers, assist in identifying individuals who have been working in the food processing plant for less than five years. Legitimate Peripheral Participation is useful in understanding how learning about food waste happens. Lastly, the concept mediation is useful in understanding the enabling tools of newcomers to become experts in reducing food waste.

2.5 Summary and conclusion to the literature review

This chapter has engaged with extant literature relevant for addressing research questions posed for this study. It started by describing the South African food processing industry, and its challenges, of which food waste is a major one. This was followed by a discussion on knowledge and skills demand within the food processing sector, and a description of work-based learning and its associated concepts such as learning at and through work. The chapter explored the main methods, benefits, and challenges of adopting work-based learning. Lastly, the concepts of situated learning were described and evaluated as the concepts to frame the study.

This chapter has described several issues regarding learning at and through work. It has shown how the South African food processing industry has transitioned from the manual to the technologically driven, bringing about the need to upskill food processors involved along the food processing industry. There is considerable international literature on employees learning about food waste, but such literature is very limited in the South African context. The substantial amount of food that is wasted along the food processing stage raises concerns about education and training through the stage of processing. Despite the critiques of situated learning, the concepts will be useful in this study to establish two things. The first is whether employees learn anything about food waste while working in the processing of food. The second is to establish if employees learn about food waste; what they learn; and how they learn.

This chapter has engaged with literature on work-based learning. This study investigates employees learning about food waste when commercially processing food in a food processing company. The next chapter explains how data was collected and analysed in finding out employees learning about food waste during the commercial processing of food.

CHAPTER 3: METHODOLOGY

3.1 Introduction

This chapter gives a description of the research methods used to answer the research questions introduced in chapter one. This chapter describes the study area where primary data was collected. It will discuss data collection methods used and how data quality control was maintained. It will further indicate how issues of ethics were considered, outline research limitations, and explain how data was analysed.

Figure 1 provides an overview of how this chapter is organised.

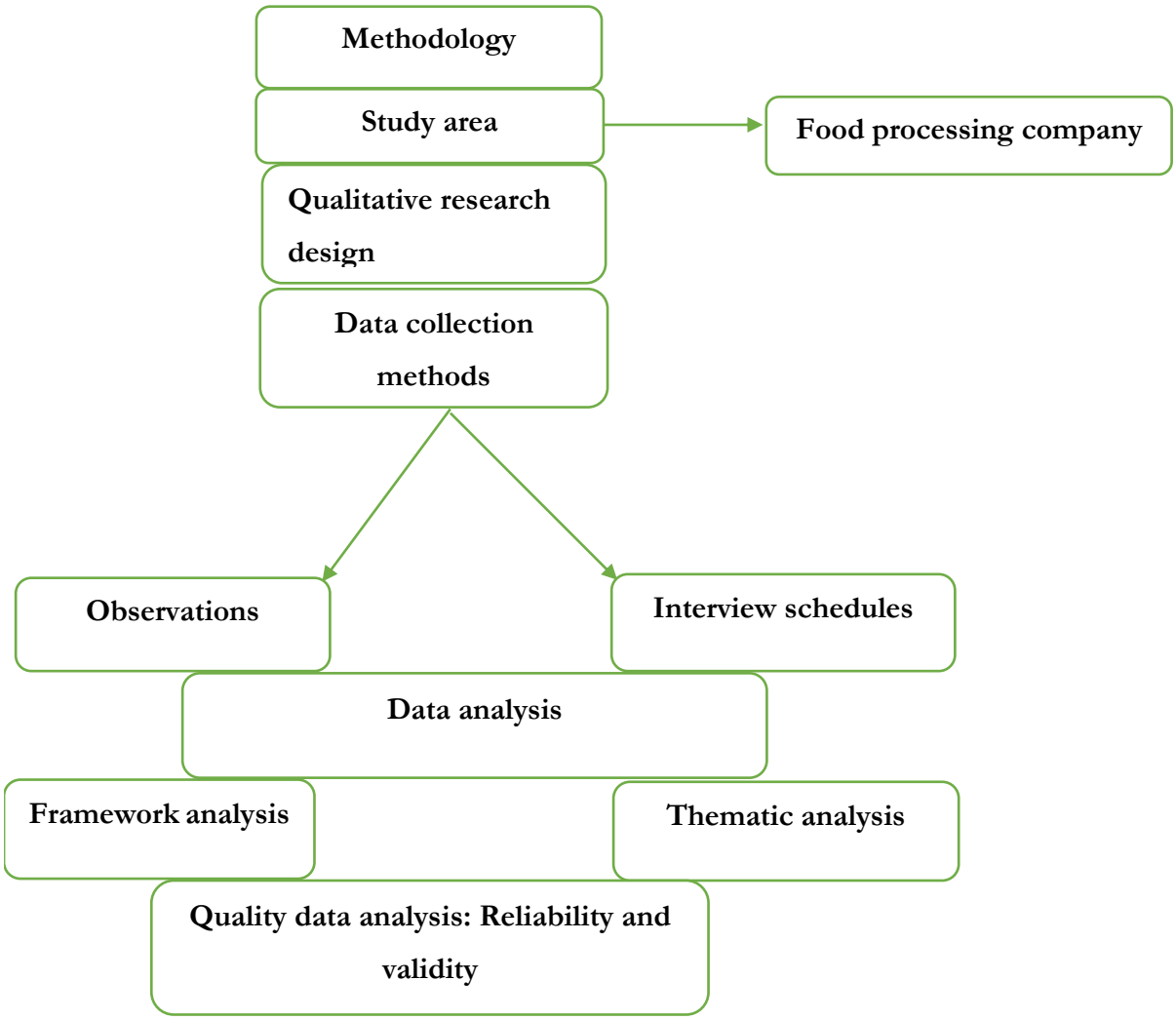


Figure 1: Detailed methodological framework in relation to the framework of the study

Source: Developed by the Author (2022).

3.2 Study area: Teaching and learning about food waste: A case of a large food processing company

Detailed primary data on how employees learn about food waste was collected from a large food processing company located in Gauteng Province, South Africa. The company was selected as it is a signatory to South Africa's Food Loss and Waste Initiative and are therefore committed to reducing food waste by 50% by 2030. In addition, the company was known by one of my supervisors who facilitated access and introduced me to the company. The company processes and packs fresh produce and juices for the retail market. Several food types are processed and manufactured including fruit, vegetables, salads, cakes, meat and pancakes. The company receives fresh raw food materials from a number of farms and suppliers by trucks every day. It processes and packages these products for local and international customers.

3.3 Data collection methods

This is a qualitative research study, for which two methods were used to collect data: face-face interviews and on-site observations. In preparation of data collection, I made visited the company to introduce the research, get to know the relevant staff who would assist with data collection and the site visit and to better understand the business operations. In the first phase of data collection, interviews were conducted with employees on site. The second phase involved observations across three departments. These methods have been used by other studies that focused on sustainability practices (Abdul Rahim et al. 2009; Anvik et al. 2020; Berragan, 2011) and were useful for obtaining data to use in answering the study's research questions. In the following section, I discuss each data collection method in detail, indicating how each was employed to gather detailed data.

3.3.1 Interviews

Face-face interviews were conducted and recorded with 15 participants, including management, employees (experts and newcomers), and sustainability trainers identified in consultation with the food processing company. This form of data collection was selected because it allows researchers to investigate in an in-depth manner, allowing insights into how different phenomena of interest are experienced and perceived (McGrath et al. 2019).

Lave and Wenger (1991) theory of situated learning was used as a framework to guide the selection and categorisation of participants as newcomers or experts. Additionally, the sustainability trainers and management team were selected as participants in this study. These two groups of participants were selected to solicit data on the nature of learning (organisation and facilitation) about food waste in the company.

The interview questions were semi-structured with open-ended questions in English. However, they were conducted in English, Sepedi, and IsiZulu to make it easier for all the participants to express themselves without any language barriers. The face-face interviews were carried out on-site over a period of three days. Each interview lasted approximately forty-five minutes. Interviews were recorded and transcribed for analysis. The interviews provided insights into how employees learn about food waste when commercially processing food. All the

participants were selected in consultation with the food processing company where the data was collected.

i) The management team

In this study, four individuals from the management team were interviewed from the finance, procurement, packaging buyers, Safety, Health, Environment and Quality (SHEQ) departments in the company. This category was chosen to gather data to help understand the type(s) of work-based learning opportunities about food waste provided and the reasons for selecting them.

ii) Sustainability trainers

Two individuals were interviewed from this category to gather data related to the sustainability and food waste reduction training provided. These were the Chief Technical Food Science Officer and Sustainability Coordinator

iii) Employees: Experts and newcomers

Employees interviewed in this study are divided into two categories: experts and newcomers. Experts refer to those who have been working in the plant for more than five years. The assumption is that an employee who has worked in food processing for more than five years is likely to be more skilled at reducing food waste than newcomer employees. A total of five experts were interviewed. This group was interviewed to gather data on how, if at all, they organise and facilitate work-based learning about food waste for newcomers. The second group of employees, newcomers, refers to employees who have been working in the processing plant for less than five years. A total of four newcomers were interviewed. The assumption is that an employee who has worked in food processing for less than five years is likely to be less skilled at reducing food waste. This category of employees was selected to find out what they know or do not know about food waste, how they learn, and the challenges they face when learning how to commercially process food without wasting it.

I used my mobile phone and a recording device provided by the University of the Witwatersrand to make sure that if I lost one device, the recording could be accessed on the other device. Each day after the interview, I transcribed all the interviews for the day. All the transcripts are stored in the cloud with an encrypted password that is known only to me, the researcher. I assured all the participants that I always share transcripts with them to show them that no fabrications or alterations were made to what was discussed.

3.3.2 Observations

On-site observations were conducted to further understand food processing and waste practices. Observations were selected because they help interpret what participants report or do not explain verbally (Balcom et al. 2021). This method confirmed and contradicted some of the insights that were provided by the participants interviewed. Results from observations will be discussed briefly in the following Chapter. Below, I describe the observations conducted and the empirical data gathered.

The observation activities were informed by an observation schedule indicating what to observe, such as workplace food waste practices and interrelationships between the participants (newcomers, experts, and sustainability trainers), and the mediating tools inside the food processing plant to support food waste reductions. In most instances employees were unaware they were being observed, photographs were not taken (for confidentiality reasons) and where appropriate notes were taken to capture observations.

i) Observations: First phase

The first observation was undertaken during the case company`s Food Awareness Day. I observed how employees are taught how to manage food waste "during lunchtime". In this instance, employees were aware that they were being observed On Food Awareness Day, employees come together during their lunchtimes and volunteer to take part in learning to reduce and handle food waste in the canteen. The main purpose of Food Awareness Day is to teach employees how to handle and reduce food waste during their lunchtime. This form of learning is coordinated by the Sustainability Coordinator, who is part of the company. Employees working inside the food processing plant volunteer to take part in this engagement, and on that day, almost half of the employees working on the line took part in the session. I gathered some important insights on how and what employees learn about food waste.

ii) Observations: The second phase

The second observation took place after the interviews. The purpose of this observation was to observe on-site employee related food waste practices. I was guided by the sustainability trainer as I moved through the different departments – receiving, mixing, and dispatch. As most of these departments are 'high-risk', observation took place through glass windows.

3.4 Data Quality Control: validity and reliability

Data Quality Control refers to how the researcher ensures that the data-gathering instruments used measure what they are supposed to measure in a consistent manner, normally referred to as validity and reliability (Nayak & Singh, 2021). I ensured the accuracy and trustworthiness of the findings from all the respondents to ensure that everything written in this paper is a true reflection of what they said during interviews. By doing so, I did not change any of their statements to answer my research questions; everything written was exactly what they said. Before submitting the research study to the Wits School of Education, it will be sent electronically to the sustainability team to share with all the designated people in the food processing company.

3.5 Ethical considerations

In terms of ethical considerations, issues of confidentiality, anonymity, and consent were maintained for data collection and presentation. An application for ethics clearance was sent to the University of the Witwatersrand Ethics Committee and accepted. Given the confidential nature of the activities undertaken by the case study company, Non-Disclosure Agreement (NDA) was signed between myself (the researcher), and the case study company. By signing this NDA, I was agreeing that when writing the research report, I would not disclose the name of the food processing company or interview respondents.

Interviews and observations were all arranged in consultation with the case study company. Before undertaking interviews, participants signed a consent and participation form, agreeing to be interviewed. I also explained to all the participants what the study is about, read the terms and conditions, and assured them that issues of anonymity and confidentiality would be maintained when writing the research report. Participants were also assured that if, during the interview, they no longer felt comfortable with what was being asked, they could withdraw. In addition, all participants agreed to being recorded.

Having set out the data collection method, in the next section I discuss how the data was analysed.

3.6 Data analysis

Due to the amount of data in a single case study, extensive coding was not undertaken. This is because it is acknowledged that detailed coding for a single case study can lead to some codes being abandoned (Miles, 1979). The researcher does, however, need to guard against attempting to construct a superficially seamless narrative (Yeh et al. 2010). Therefore, the data analysis was informed by the conceptual framework as well as other concepts, as outlined in chapter 2.

A critical component of the data analysis in this study was the order in which processes took place. As a single case study approach was used to allow the data to speak before engaging in critical analysis. To accomplish this, an analytical framework was developed. Key concepts derived from the situated learning literature were used to identify some of the dimensions, and then themes, which will be discussed in the next chapter.

Four dimensions from situated learning were used as the framework to analyse data. The first dimension focuses on the roles and responsibilities of newcomers, experts, management, and sustainability trainers. The second dimension focuses on the types of relationships between newcomers, experts, management and sustainability trainers. The third dimension focuses on the evidence of collaboration between newcomers, experts, management and sustainability trainers. The focus of this dimension is on examples of mediation in learning about food waste portrayed by the employees. The fourth dimension focuses on the challenges faced by newcomers, experts, management and sustainability trainers.

3.7 Conclusions

This chapter has presented the methodology of the study. Data was collected to inform a single case study of a food processing company. A single case study enabled the collection of sufficient data for the study. In the collection of primary data, face-to-face interviews and on-site observations were used to collect data from three categories of participants. Using these two methods assisted in gathering in-depth information. The chapter also explained how data validity and reliability were maintained when collecting data, given that validity and reliability are important for ensuring all the findings are a true reflection of what participants indicated. The chapter has also outlined how issues of ethics were considered in consultation with the

university and the company studied. And lastly, the chapter has explained how data was analysed. By using key concepts, face-to-face interview questions, and on-site observations to identify the dimensions of situated learning, four dimensions have been used to analyse the findings. The next chapter presents data findings and interpretations.

CHAPTER 4: RESEARCH FINDINGS

4.1 Introduction

In this chapter, I present findings based on the analysis of data collected through face-to-face interviews and on-site observations. The literature and research questions of the study guided the type of data collected. The main question to answer was: "How do employees learn to reduce food waste when commercially processing food?" The four sub-questions were formulated to understand employees' knowledge about food waste in the commercial processing of food, identify the types of work-based learning about food waste, how the learning about food waste is organised and facilitated, and identify the challenges faced when organising and facilitating work-based learning about food waste. This chapter begins by describing the study participants' biographical information and employees' knowledge about food waste. This section is followed by themes that emerged from the analysis of the four dimensions of situated learning.

4.2 Biographical information about the participants

This study`s participants comprised of newcomers, experts, sustainability trainers and management. In total, fifteen interviews were conducted at the large food processing company with five experts, four newcomers, four members of the management team, and two sustainability trainers. Thirteen participants were female, and two males. The table below documents the profiles of the participants.

Table 1. Biographical information about the participants

Participants	Gender	Age	Race	Participant category	Number of years working in the food processing company

Participant 1	Female	46	Black African	Expert	12 years
Participant 2	Female	41	Black African	Newcomer	8 months
Participant 3	Female	32	Black African	Newcomer	9 months
Participant 4	Female	32	Black African	Expert	9 years
Participant 5	Female	28	Black African	Newcomer	3 years
Participant 6	Female	38	Black African	Expert	11 years
Participant 7	Female	41	White African	Management	7 years
Participant 8	Male	35	Black African	Management	3 years
Participant 9	Female	31	Black African	Management	2 years
Participant 10	Female	58	Black African	Expert	27 years
Participant 11	Female	41	White African	Management	12 years
Participant 12	Male	23	Black African	Newcomer	2 years
Participant 13	Female	38	Black African	Expert	12 years
Participant 14	Female	32	White African	Sustainability trainer	5 years
Participant 15	Female	46	White African	Sustainability trainer	20 years

Source: Authors participants of the study, 2023

In establishing the context for learning about food waste, it is important to understand the knowledge and skills that participants already have about food waste in a food processing

company. The next section looks at the employees` knowledge about food waste to understand what they know and do not know about it.

4.3 Employees` understanding of food waste

Employees' knowledge about food waste could be extrapolated from the data in numerous ways. When interviewed, employees indicated that food is regarded as waste when it is rejected by both the low and high-risk departments for any of several reasons. Three sub-themes emanating from the data indicate employees' knowledge about food waste, and this were expired food, food that is in poor condition, and food spillages on the floor. These are discussed further below.

4.3.1 Expired food as food waste

Some participants described food waste as expired food in the food processing plant. They indicated that keeping processed food in storage for too long leads to food expiring. The participants stated that they have to discard this food because it cannot be used for human consumption due to the fact that it has passed its sell-by date. A participant, who is a general worker stated:

> *"Food that is expired cannot be packed and is regarded as waste" (Participant 4, Expert).*

In the same vein, an expert from the New Product Development team mentioned that they are forced to dispose of food that has expired because it stayed too long in the storage facility. This participant, who is a New Product Development manager, stated:

> *"Food that has passed its shelf life is a waste and cannot be packed because it has expired and cannot be used for human consumption" (Participant 13, Expert).*

A newcomer, who is a product receiver, shared the same view of expired food as experts (Participant 4 and Participant 13). Worth noting is that the newcomer indicated how they handle expired food in their department. This participant stated:

> *"In our department, we put expired food in big plastic bags and place them inside the bins for waste collections" (Participant 12, Newcomer).*

The responses of these participants suggest that employees understand that expired food cannot be accepted by their low and high-risk departments and thereby regard it as food waste

(Participant 4, Participant 13, and Participant 12). It is worth noting that both newcomers and experts have a common understanding of what constitutes expired food, and newcomers also understand how to handle such food waste in their departments.

4.3.2 Food in poor condition as food waste

It was indicated by participants that when they start their shift, they sometimes find food that had been processed by a previous shift in poor condition. Usually, what happens is that they examine the food with their team leaders, supervisors, or process controllers to confirm whether the food should be considered waste. In other cases, participants stated that they are able to identify food that is in poor condition as it moves through the conveyor belt. As a result, they have to call process controllers to decide if the food must be re-prepared or re-cooked to make sure that it is in good condition. But if the team leaders find that some products cannot be packed, then they reject the food and regard it as waste. Other participants indicated that sometimes some products come in poor condition fresh from the farms and will not be processed. One participant, who is a newcomer, clearly stated:

> *"When food is in poor condition from the farms, it will be regarded as a waste, and we will not process it" (Participant 2, Newcomer).*

With reference to food that is in poor condition, Participant 12, who is a product receiver, echoed the words of a newcomer (Participant 12) and mentioned that:

> *"Some fresh produce arrives in our departments in poor condition from the farm; we reject it, don't further process it, and then regard it as waste" (Participant 12, Newcomer).*

Participant 5, who is a general worker, differed from Participant 2, who is a process controller, and Participant 12, who is a product receiver, by describing food that is in poor condition as:

> *"As the pancake is moving along the belt, we are able to see from its colour if it is in good condition. If it is light, then it is in poor condition and will have to reject it and regard it as waste" (Participant 5, Newcomer).*

These varied responses suggest that either employees have different understandings about food that is in poor condition, or they chose to describe different examples of food waste that is in poor condition (Participant 2, Participant 5, and Participant 12).

4.3.3 Food spillages on the floor as food waste.

It was also discovered that when food spills on the floor, it is rejected by the department and therefore, becomes waste. Participants described some of the causes of food spills on the floor, such as the handling of heavy trolleys. One participant, who is a process controller, stated:

> *"Food that spills on the floor when handling trolleys because they are so heavy to handle is regarded as waste" (Participant 3, Newcomer).*

This was also observed in observation number 4, when one of the employees spilled cabbage on the floor (observation schedule 4). The employee did not pick up the spilled food, but continued processing the cabbage. An employee who moves around the plant with a large plastic bag of waste collected the spilled cabbage (observation schedule 5).

It is evident from the biographical profile of the participants that women make up the bulk of the workforce in the food processing plant. Some of these women may lack the physical strength to handle heavy trollies. To support the issue of having more women than men, an expert, who is a process controller, stated:

> *"Women dominate our department. Like today, we do not have a male version in our department; we are calling men from other departments to come in and assist us because these pots are too heavy" (Participant 1, Expert).*

This was also discovered during the first and second phases of on-site observation, in which it was observed that there are more women than men involved in processing food in the company (observation schedules 3, 6, 7, 9 and 12). I also saw several men cross-switching departments, where they were needed to assist in handling trolleys (observation schedule 1 and observation schedule 2).

Participant 6, who is a team leader, shared the same view on food that spills, in that they are not allowed to pick up food that has spilled on the floor. The participant stated:

> *"All the food that spills on the floor as we are working is regarded as waste, and we don't pick it up" (Participant 6, Expert).*

A process controller who works in the juice processing department also indicated that as juice spills on the floor is regarded as waste. This participant stated:

"For an example, let's say we are packing juice and then it spills on the floor, then that will be regarded as a waste" (Participant 1, Expert).

In this case, the experts (Participant 1 and Participant 6) do not explain how they handle food that spills on the floor, in contrast to a newcomer (Participant 12) who stated how they handle expired food that is considered waste.

The responses presented above indicate that employees` knowledge about food waste can be placed into three categories: expired food, food spillage on the floor, and food that is in poor condition. The analysis showed that employees do not connect the issue of food waste to the work that they are doing. This confirms some of the assertions and presumptions about employees' knowledge of food waste from the literature, which will be discussed in the following chapter.

Having presented employees` knowledge about food waste, I next describe the various opportunities available for employees to learn about food waste in a processing plant.

4.4 Opportunities for employees to learn about food waste

The findings revealed that there are various opportunities for employees to learn about food waste within the processing plant. These include induction training, New Product Development, work experience, supervision, and reactive learning, as described below:

4.4.1 Induction training as a mechanism for learning about food waste

During the interviews, some participants indicated that when they start a new job, they go through induction training. They indicated that they are introduced to how food is processed without wasting it. One participant, who is a process controller, clearly stated:

"We are partially trained once about food waste around the component of food safety and health by sustainability trainers during induction training and then we transfer the knowledge amongst each other every day as we process food" (Participant 1, Expert).

A participant, who is a newcomer, shared the same views and indicated that the only time they learn about food waste is when they are learning about general waste management during induction. The participant indicated that they will transfer the knowledge to each other as they process food. This participant stated:

"We are partially introduced to the component of learning about food waste within general waste management learning during the induction training and transfer the knowledge to each other on the floor" (Participant 5, Newcomer).

A participant from the management team also supported the view that learning about food waste is partially covered in induction training when employees learn about food safety, noting that:

> *"Since we work with food, every employee goes through an induction to learn about food safety and health, and that is where they partially learn about food waste" (Participant 7, Management).*

This finding shows that learning about food waste is partially included in other sustainability issues such as food safety and health and general waste. Participants indicated that they teach each other extensively as they process food on the floor (Participant 1 and Participant 5).

4.4.2 "Reactive learning" as a mechanism for learning about food waste

Reactive learning, which is defined as a form of learning that takes place almost spontaneously and in response to recent, current, or imminent situations but without any time being specifically set aside for it (Buhalis & O'Connor, 2005), was discovered as the most common way of learning about food waste. Participants indicated that this way of learning is the main source of learning about food waste. They mentioned that this way of learning is used after substantial amounts of food have been wasted. They indicated that process controllers and team leaders come to the factory floor to make observations of the causes of food waste. It was further indicated that a report will be written and presented to the employees, who caused the waste so that the same practices of wasting food are not repeated when processing food. It was discovered that this report will be presented through word of mouth by demonstrating to employees who will participate by doing, to see if they understand how waste can be avoided. One participant, who is a product receiver, stated that:

> *"After wasting substantial amounts of food, our team leaders and process controllers will write a report on what caused food waste and communicate it to us, and by so, we might do better next time" (Participant 12, Newcomer).*

The same views were shared by experts who emphasised reactive learning as commonly used for learning about food waste. The participant, who is a team leader, stated that:

> *"Process controllers tell us to wash machines after having discovered that we are processing food products without cleaning the machines and this leads to substantial amount of food wasted" (Participant 6, Expert).*

The other expert, who is a process controller, supported the view that food waste is managed reactively, where line managers will go with them on the floor to highlight the issue "to the employees who wasted the food. The participant stated:

> *"We only learn and teach our employees about food waste through a word of mouth when there is an incident of food waste on the floor" (Participant 1, Expert).*

The other expert, who is a factory production manager, mentioned that there are no arrangements for learning how to reduce food waste when processing food. The participant stated:

> *"There are no structured ways of learning to reduce food waste. We teach our employees after there is an incident of too much food wasted" (Participant 10, Expert).*

The finding suggests that learning about food waste is not proactive and continues to be managed in a reactive way. Participants indicated that this approach is used as a way of teaching and learning how to reduce food waste when processing food in their lines of work (Participant 1, Participant 6, Participant 10, and Participant 12). It was indicated that this approach is used because there are no structured ways of learning about food waste (Participant 10).

4.4.3 New Product Development as a mechanism for learning about food waste

It was indicated that learning about food waste is sometimes acquired when a new product is introduced within the processing plant. Participants from the New Product Development team indicated that they look at the risk, safety, and commission associated with the new product to be processed to determine whether the organisation is going to benefit from the product. This suggests that more awareness is given to food safety, risk, and profits relative to food waste. One participant stated that:

> *"We demonstrate to employees on ways to reduce food waste when teaching them about the safety and risks associated with the new product introduced in the plant" (Participant 13, Expert).*

The factory production manager agreed that learning about food waste is part of what is offered when introducing a new product. She emphasised more on issues around food safety and health. The participant said:

"When we introduce a new product in food processing lines, we teach them about food safety and health in the processing of food. So, we also try to teach them how to minimise wasting it" (Participant 10, Expert).

The findings from this mechanism indicate that New Product Development can be an opportunity to learn about food waste. However, this only happens when a new product is being introduced into the processing plant, not on a continuous basis. There are no structured ways of learning about food waste around the new products.

4.4.4 Workshops as a mechanism for learning about food waste

Sustainability trainers indicated that they provide workshops that focus on general waste, but with limited focus on how to reduce food waste when commercially processing food. It was indicated that participation in these workshops is voluntary. These workshops are hosted four times a year and about two to four roadshows a year. The workshops happen face-to-face, and they discuss what's happening on-site and how they can improve and use each other's techniques across the company. A participant who is a sustainability coordinator stated:

"We have workshops where we teach employees about general waste. So, we also partially include the element of the learning about food waste" (Participant 14, Sustainability trainer).

A management participant shared the same view that during workshops on general waste management, employees are also partially taught on how to reduce food waste. The participant stated:

We do not have any structured plans on learning about food waste, but employees partially learn about it during workshops" (Participant 9, Management).

Learning through a workshop was also observed during the first phase of observations (observation, phase 1). I observed a group of employees coming together to learn through the workshop, which was organised by the sustainability team and was named "Food Awareness Day". During this awareness day, employees learned about food recycling, reusing, safety, and health. The workshop is not about food waste, and when interviewed, sustainability trainers indicated that there are no workshops on food waste (Participant 14 and Participant 15). This showed that there are low levels of awareness about food waste.

The findings on the opportunities for employees to learn about food waste indicate that there are no structured ways of learning about food waste. Food waste reduction during processing is partially included in the other sustainability trainings mentioned above. This learning component does not receive high levels of awareness as compared to other sustainability issues such as food safety, health, and waste management. This finding will be further discussed in the following chapter of discussions and summaries of findings. In the next section, I describe and discuss how learning about food waste is organised and facilitated.

4.5 Organising and facilitating the learning about food waste

From the data, it was found that within the processing plant, different mechanisms were used to organise and facilitate employees` learning about food waste. This started with the roles and responsibilities of different workers in the industry playing their roles in terms of who is doing what for joint collaboration to discuss in teams what training should happen, by whom, and what should be covered in the training, as presented below.

4.5.1 Mediation in organising and facilitating the learning about food waste

Mediation was found to play a crucial role in the learning opportunities available to employees in the processing plant. Mediation offered food-waste learning opportunities using several tools. One of the tools was the employees themselves, where more experienced employees taught those with less experience about food waste reduction. One expert, who is a process controller, said:

> *"We use our experience and demonstrate as experts to teach newcomers how they can reduce food waste on the floor" (Participant 1, Expert).*

These experts attain their knowledge and skills through induction training, and continuous practice as reported below:

> *"Food waste knowledge is informally shared to us by sustainability trainers during induction training and then we transfer the knowledge amongst each other every day as we process food" (Participant 1, Expert).*

The newcomers would then act as mediators to fellow newcomers or even other experts in the factory and share the knowledge that they have acquired as shown below:

"We teach each other how to reduce food waste as we are working, and over time we understand it better" (Participant 3, Newcomer).

Another form of mediation tool consists of signage indicating food safety and health issues to all the employees, with visuals used for these who are not print literate. Participant 4, who is a general worker, stated:

"I wish they can place posters and signs for those that cannot read about food waste, like they do with food safety and health" (Participant 4, Expert).

During the second phase of on-site observation, I noted the following titled sign "Keep your Personal Protective Equipment (PPE) on at all times when handling food" at the entrance door of each processing department. This indicates that tools such as posters and signs in the plant on food safety and health can offer good visual representation around such sustainability issues. This suggests that signs and posters on how food waste can be reduced during food processing in the plant can play an important role in helping employees learn about food waste.

4.5.2 Roles and responsibilities of newcomers, experts, sustainability trainers and management

It was discovered that because of power dynamics, both newcomers and experts, sustainability trainers and management team are in charge of organising and facilitating employees' learning about food waste. However, their roles differ when it comes to facilitating and organising training related to food waste. For example, experts are full-time employees who have other responsibilities in addition to training fellow employees. One expert explained their role as follows:

"*I am a general worker; I receive pots from low care and then further process the food. I report to the team leader in my line of work" (Participant 4, Expert).*

While the above expert was a general worker, another expert, who is a process controller, explained his role as being a process controller and this played a role in facilitating reactive learning about food waste. The participant stated that:

"As process controllers, we are the ones who come into the plant after employees have wasted a substantial amount of food to highlight and teach them how this issue can be avoided" (Participant 1, Expert).

The other process controller, who is a newcomer, shared the same view as the expert and indicated that her role is to teach employees how to reduce food waste after they have wasted substantial amount of food on the floor. The participant stated:

> *"My role around food waste is to work with line managers and team leaders in addressing the issue of food waste after employees have wasted substantial amounts of food on the floor" (Participant 2, Newcomer).*

By contrast, the sustainability trainer`s main role lies directly in the training of employees about food waste and sustainable food production. Sustainability trainers describe different roles in organising and facilitating the learning about food waste within the food processing company. Except for training employees, one sustainability trainer indicated that her other responsibility is to develop strategies for sustainability education and learning. This participant mentioned that:

> *"I am a Chief Technical Food Science Officer. I set our sustainability and environmental strategies for employees to learn about sustainability issues" (Participant 15, Sustainability trainer).*

A second sustainability trainer describe her main responsibility as being to organise and facilitate sustainability education in the company. This participant stated that:

> "*I am the sustainability coordinator. I facilitate all sustainability training issues in the company" (Participant 14, Sustainability trainer).*

The above participant also explained her role as an educator and facilitator of learning about food waste by stating:

> *"We educate our employees about sustainability issues such as food safety and health, and food waste during induction." (Participant 14, Sustainability trainer).*

I observed this during the first phase of on-site observations where the sustainability trainer facilitated a workshop on food waste awareness (observation, phase 1). The workshop was focused on aspects such as re-using and recycling food that is no longer edible.

The findings above indicate that newcomers, experts, and sustainability trainers work together to find ways to teach about food waste. The data revealed that, because of power dynamics, there are cases within low- and high-risk departments where the teaching and learning between newcomers and experts is reversed, as compared to some of the assumptions that were

discovered in the literature. It was discovered from the analysis that, because of power dynamics, there are cases where newcomers who are process controllers or team leaders teach experts who are general workers.

4.5.3 Collaborations between newcomers, experts, sustainability trainers and management

Collaborations between newcomers, experts, general workers, sustainability trainers, and other workers within the factory enable the facilitation and organisation of learning about food waste. One form of collaboration included workers in similar positions discussing food waste training and learning opportunities, as evidenced below:

> *"We work together with sustainability trainers to plan ways to teach employees about general waste and food safety and health. So, within the general waste learning, we also partially include the dimension of the learning about food waste" (Participant 10, Expert).*

Another form of collaboration is through informal discussions among some workers when food has been wasted within the processing plant. This was noted by a newcomer, who reported:

> *"After having wasted substantial amount of food on the floor, operation managers and team leaders come inside the plant and verbally tell us how to reduce food waste because it costs the company" (Participant 2, Newcomer).*

The findings on collaboration revealed some of the assumptions that this study builds on, particularly one of the critiques of situated learning: that it excludes the individual mode of learning. It was discovered that employees work together to carry out food waste practices. However, the collaboration around food waste is not structured but happens reactively. Employees continue to learn about food waste from other sustainability issues where food waste is partially included. This reflects the low levels of collaboration in planning about food waste in the food processing company.

4.6 Challenges faced by newcomers, experts, sustainability trainers and management in the food processing company.

The first challenge identified in the data is that of reducing food waste and the second is organising and facilitating the learning about food waste.

4.6.1 Time constraints and the need to meet set targets

It was highlighted that working under pressure and having time constraints results in the dropping of pots, which leads to food waste. One participant, who is a process controller, clearly states:

> *"We have targets to meet every day in our line of work and this causes us to work under pressure and time. As we work under pressure and time, we even drop pots and waste food" (Participant 1, Expert).*

The same view of working under pressure was shared by a newcomer who regarded this challenge as the major cause of food waste. The newcomer, who is a process controller, stated:

> *"The pressure that we experience when working with food leads to too much food being wasted" (Participant 3, Newcomer).*

Because of working under pressure and facing time constraints, some participants indicated that they do not have time to wash out the remaining processed products from the machines and this led to the rejection of products as two different products would have mixed in a single package. One participant who is a product receiver stated:

> *"We don't have time to wash the machine when we are pressed for time and working under pressure" (Participant 12, Newcomer).*

An expert, who is a team leader, held similar views to the newcomer on how unwashed machines lead to food waste. This expert stated that:

> *"Employees do not clean the processing machines or belts after using them for a certain food product of which mixes the two different products, and then we have to reject food that mixed" (Participant 6, Expert).*

4.6.2 Lack of structured learning about food waste

Another challenge resulting in food waste was discovered to be a lack of structured learning about food waste. Participants, particularly newcomers, mentioned that part of the reason why substantial amounts of food are wasted is because there is no structured learning about food waste. They indicated that they are only made aware of food waste after having wasted a substantial amount of food. Participant 3, who is a process controller, stated that:

> *"There are no structured ways of learning about food waste when commercially processing food" (Participant 3, Newcomer).*

To support this agreement on the lack of structured learning, the other newcomer stated that they copy each other as they process food on the floor to reduce food waste. The participant stated that:

> *"Since there are no learning ways on how to reduce food waste when commercially processing food, we just teach and copy from each other as we process food on the floor" (Participant 5, Newcomer).*

Furthermore, a third newcomer agreed with the lack of structured learning on food waste and stated that there is no food waste signage within the plant, only signs on food safety, health, and general waste. This participant, who is a process controller, stated that:

> *"We do not have posters or signs in our department indicating how to reduce food waste as we process it" (Participant 2, Newcomer).*

This suggests that there is less awareness of how to reduce food waste in the food processing plant than about other sustainability issues for which there is signage.

4.6.3 Gender issues related to food waste

Gender issues were also discovered as a challenge when commercially processing food. Participant 1, who is a process controller, noted that there are more women than men in their department. She stated that there is some equipment that requires men's power, and when women fail to handle it well, they normally drop pots. The participant mentioned that when also handling the trolleys, they sometimes spill the pots because they are too heavy and need someone with strength ("a man") to handle them. The participant noted that:

> *"Women dominate our department; we do not even have a male in our department. It is only women and this also contributes towards food waste because men's power is essential in handling some pots. Even in the receivers, we do not have a male" (Participant 1, Expert).*

This suggests that gender balance is important in food processing companies, as some equipment requires some manpower to handle.

Despite the fact that there are no structured ways of learning about food waste, a theme of challenges faced when organising and facilitating the learning about food waste emerged from

the analysis of the challenges leading to food waste. This theme aids in understanding the challenges that employers and employees face when facilitating and organising learning about food waste. Below, I discuss the three sub-themes of challenges identified:

4.6.4 Cultural divergences and attitude as a challenge in organising and facilitating the learning about food waste.

One of the learning challenges identified is difficulty in dealing with cultural differences. Sustainability trainers mentioned that it is difficult to deliver training about food waste due to cultural differences, particularly to employees from informal settlements. The Chief Technical Food Science Officer stated:

> *"It is difficult to change employees' culture of processing food without wasting it. I think we need to find ways of structuring the learning about food waste such that we can change their culture of wasting food" (Participant 15, Sustainability trainer).*

In the same view, participant 10, who is a New Product Development manager, said that changing someone`s practices and teaching them how to process food without wasting it is difficult. This participant stated:

> *"Sometimes it is difficult to change someone`s culture. Like for an instance, some employees will tell you that they were used to doing it this way and now you come in to change their ways, then it becomes a challenge for you as the leader for the training" (Participant 10, Expert).*

The comments made by these two participants suggest that socio-cultural differences among employees need to be considered in facilitating and organising the learning about food waste (Participant 14 and Participant 15).

4.6.5 Language as a challenge in organising and facilitating the learning about food waste when commercially processing food.

Issues of language were also mentioned as a challenge. It was indicated that some employees do not understand English as a medium of communication when learning about food waste. A sustainability coordinator stated:

> *"Language can be a barrier to understand the learning about food waste" (Participant 14, Sustainability trainer).*

Experts agree with the statement above and mention that language has always been a barrier to teaching and understanding how to reduce food waste. One participant, who is an expert, indicated that issues of language influence how employees become skilled in reducing food waste, and those that find it difficult to understand the language take more time to become knowledgeable and skilled. This participant stated that:

> *"Issues of language is a challenge when teaching employees to reduce food waste and because of this, it takes time for them to change their behaviour" (Participant 10, Expert)*

A product receiver indicated that they find it difficult to understand food waste in English. The participant advocated for the use of their local language to better understand food waste by stating that:

> *"Language is a challenge to some of us when learning about food waste. at least they should teach us in a language that we understand like IsiZulu" (Participant 12, Newcomer).*

This reflects that cultural background continues to be a challenge when learning about food waste. By implication, this shows that employees need to be taught in a language that they understand.

4.6.6 Lack of interest from employees and employers in the value workplace learning as a source of learning about food waste

Lack of interest from employees and employers in recognising the value of learning about food waste was highlighted as a challenge. It was highlighted that some employees do not understand the implication of lacking interest in learning about food waste. A newcomer, who is a process controller, stated that employees do not seem interested in workplace learning. This participant stated:

> *"Employees are not interested in the learning and do not understand the damage that they are causing to the company by not embracing learning" (Participant 2, Newcomer).*

Another newcomer, who is a product receiver, indicated that the company is not interested in providing opportunities for learning about food waste. This participant stated:

> *"The company is not interested in learning about food waste. If they were, they would have structured learning opportunities on food waste" (Participant 12, Newcomer).*

Another participant, who is a process controller, indicated that the company (employers) are more focused on profit maximisation than learning about food waste and do not understand that food waste continues to affect their profits. This expert stated that:

> *"The company is not interested in teaching us about food waste. All that they want to see is us processing food and making money" (Participant 1, Expert).*

The views on focusing more on maximising profits over the learning about food waste was also highlighted by a participant in management. The participant stated:

> *"The subject of food waste is not given much attention as it should be. We focus more on making profits and do not have time to be teaching employees during food processing" (Participant 8, Management).*

These responses show that both employees' and employers' lack of workplace learning about food waste continues to contribute to food waste. Lack of interest from employers is evident in the lack of opportunities for learning about food waste.

A management participant indicated that there is still a lack of recognition of the importance of structuring work-based learning about food waste when commercially processing food, indicating that:

> *"The company has not been prioritising the learning about food waste and this is a serious issue that is affecting our profits" (Participant 11, Management).*

This sentiment was shared by another management participant, indicating that there is gap in structuring the learning about food waste. The participant stated:

> *"We have recycling programmes and roadshows that focus on food safety and health and general waste management. There still exists a gap in including the component of learning about food waste in our recycling programmes and roadshows" (Participant 9, Management).*

The findings from the data indicated that there are practical challenges that result in food waste, as well as challenges in organising and facilitating learning about food waste. From the analysis of the data, it is evident that as employees continue to face pressures from moving belts and the need to meet targets, they drop pots, which results in food waste. And again, issues of having more women than men along the production line result in the dropping of pots since the

trolleys and pots are too heavy. On the other hand, cultural background and a lack of motivation in recognising work-based learning about food waste were discovered to be challenges in organising and facilitating the learning about food waste. These challenges affirm some of the assumptions and claims in the literature and will be discussed in depth in the next chapter.

4.7 Conclusion

In this chapter, I presented the findings analysed thematically based on data collected through face-to-face interviews and on-site observations. This chapter began with biographical information about the study participants. The study`s participants consisted of newcomers, experts, sustainability trainers, and the management team. In establishing out the context of learning about food waste, I then presented employees` knowledge around food waste. The data showed that employees` knowledge around food waste can be summarised as expired food, food spillages on the floor, and food in poor condition, and this implied that most participants in the study do not link food waste with their work.

This was followed by a discussion of findings on the various work-based learning opportunities in food waste that employees had for learning about food waste. Some of the claims made by participants during the interviews aligned with or contradicted what was discovered through observations. The data in this company showed that there are no structured ways of learning about food waste. It was indicated that food waste is managed reactively, after substantial amounts of food have been wasted in the plant. It was further discovered that there are low levels of general awareness about food waste in the plant, as evidenced by posters and signage on food safety and health in the plant, rather than on ways of avoiding food wastage.

The next section of the chapter presented the ways in which work-based learning about food waste is organised and facilitated. First, the section indicated how different mediation tools are available and enable learning about food waste. Mediation helped in understanding how different mediation tools around other sustainability issues, such as food safety and health, can be used for organising and facilitating the learning about food waste. Secondly, the section revealed the roles and responsibilities of both newcomers and experts, sustainability trainers as well as management, in organising and facilitating the learning about food waste. It was discovered that, because of power imbalances, there are cases where newcomers, who are process controllers, facilitate the learning about food waste for experts who are general

workers. And lastly, newcomers, experts, sustainability trainers and management come together to find meaningful ways of reducing food waste in unstructured ways.

The last section of the finding presented challenges faced by experts, newcomers, sustainability trainers and management tin the food processing plant. Two themes about challenges emerged from the analysis. First, there were challenges that resulted in food waste during food processing. Three sub-themes emerged from the challenges that result in food waste. The analysis showed that employees continue to lack understanding of how to reduce food waste because of a lack of structured learning around food waste. And lastly, challenges were faced in facilitating the learning about food waste within the plant. Three sub-themes emerged from this theme. The theme showed how both employees and employers make it difficult for learning about food waste to happen.

In the next chapter, I discuss the above findings. I do this by giving an overview of the research findings and linking them back to critical literature and the conceptual framework used for this study. I also explain the limitations of the study and give critical recommendations for future research.

CHAPTER 5: DISCUSSIONS AND SUMMARY OF FINDINGS

5.1 Introduction

This study has explored employee's knowledge about food waste and opportunities for them to learn about food waste in a food processing company in Gauteng Province, South Africa. The study investigated what was understood as food waste, opportunities to learn about food waste, how work-based learning about food waste was organised and facilitated, and the challenges experienced in organising and facilitating work-based learning about food waste within the processing plant. Data gathering involved face-face interviews and on-site observations. The data collected were analysed thematically. Using a framework for analysing situated learning, I explored four dimensions of such in a Gauteng food processing company.

In this chapter, I start with the presentation of key findings.

5.2 Discussion of the findings

5.2.1 Summary of key findings

The 5.1 table presents the summary of key findings from the analysis in Chapter four.

Table 2. Summary of research findings

Category	Themes
Employees` understanding of food waste	• Expired food as food waste • Food in poor condition as food waste • Food spillages on the floor as food waste
Opportunities for employees to learn about food waste	• Induction training as a mechanism for learning about food waste • "Reactive learning" as a mechanism for learning about food waste • New Product Development as a mechanism for learning about food waste • Workshops as a mechanism for learning about food waste
Organising and facilitating the learning about food waste	• Mediation in organising and facilitating the learning about food waste • Roles and responsibilities of newcomers, experts, sustainability trainers and management • Collaborations between newcomers, experts, sustainability trainers and management
Challenges faced by newcomers, experts, sustainability trainers and management	Challenges that result in food waste: • Time constraints and the need to meet set targets • Lack of structured learning about food waste • Gender issues related to food waste Challenges faced in organising and facilitating the learning about food waste: • Cultural divergences and attitude as a challenge in facilitating and organising learning about food waste • Language as a challenge in facilitating and organising learning about food waste • Lack of interest from employees and employers in the value of learning about food waste

Source: Authors` own analysis (2023)

5.2.2 Discussion of research findings

The first section of the findings revealed that employees had different understandings of what food waste is. Some considered food waste to be expired food, while others considered food spillages on the floor to be food waste, and others considered food waste to be food that is in poor condition. The finding on food spillages on the floor aligns with Lipinski et al. (2013), who regard food that spills on the floor during processing as waste and that is no longer recognised as fit for human consumption. Again, these components confirm the claim in the literature (Betz et al. 2015; Papargyropoulou et al. 2016; Pirani & Arafat, 2016) that there are many components to consider in defining food waste, with little consensus as to what the term means. These findings on employees' knowledge about food waste are one of the contributions that this study adds to the existing debates on employees` knowledge around food waste when commercially processing food. Linking this finding to the analysis of roles and responsibilities, it is important to note that employees` knowledge about food waste is also influenced by their roles and responsibilities in the company. For instance, general workers who highlighted that they maintain a sterile working floor stipulated that food that spills on the floor is waste. This orientation to food waste suggests that an employee's perception of food waste is also influenced by the roles and responsibilities that they perform. This finding is supported by Aschemann-Witzel (2016), who conducted a study on consumer-related food waste and found that employees definitions of food waste are related to the roles and responsibilities that they perform in their lines of work.

The second section of the findings focused on work-based learning opportunities for employees to learn about food waste. Numerous ways of learning how to reduce food waste were revealed, although it was discovered that at the company studied, there are no structured ways of learning how to reduce food waste when commercially processing food. "Reactive learning" was the prominent way of learning about food waste. However, the identified employees indicated that they preferred proactive learning on food waste to reactive learning. This finding aligns with a study by Nayak and Waterson (2017) on a food waste-related issue, food safety, where the food workforce also preferred proactive learning to reactive learning. Based on the findings by Nayak and Waterson (2017) as well as the findings of this study on reactive and proactive learning, it is clear that proactive learning about sustainability issues such as food safety and waste is the most preferred way of learning than reactive learning. Reactive learning can be

related to learning at work, which was reviewed and considered to happen through engagement in routine and non-routine activities, and shaped through trusted and social guidance (Raelin, 2000). The introduction of new products was also discovered to be central to learning in various departments within the food processing plant. This was also discovered from the literature that New Product Development is another way of learning at work (Suwannaporn & Speece, 2000). It is clear that New Product Development continues to be adopted by food processing companies for work-based learning. The mentioned opportunities seemed suitable for learning about food waste during food processing if learning about food waste was to be structured in the food processing plant.

Chapter four also reported findings on the relationships between newcomers, experts, sustainability trainers and management on learning about food waste. It was highlighted from the findings that there is a teaching and learning relation between the identified participants. However, it is significant to note that the teaching and learning relationship between newcomers and experts is the other way around in relation to some of the claims in literature. It was discovered that, because of power dynamics, some newcomers who are team leaders or process controllers teach experts who are general workers on how to reduce food waste when commercially processing food. This finding contradicts previous studies (Fuller & Unwin, 2005; Lave & Wenger, 1991) that argue that experts lead newcomers in carrying out practices within communities of practice. Again, this does not align with what was discovered by Salman (2021) that experts lead and teach newcomers how to reduce food waste in food processing companies. Based on the findings of this study, it is apparent that power dynamics play an important role in how learning about food waste takes place in a food processing company.

The above section was followed by a section in the findings chapter that examined how work-based learning about food waste was organised and facilitated. Findings based on the analysis indicated that groupwork, team learning, and peer learning and teaching occur at work. It was emphasised that employees collaborate and learn from one another about food processing and waste reduction. This finding is supported by other studies (Henning, 2004; Iqbal, 2015) that found that employees work in groups when processing food. Iqbal (2015) discovered that food processing companies continue to use teamwork among workers to build their human resource pools and to promote learning from each other to reduce food waste. As a further example of collaboration, it was discovered that during reactive learning, process controllers and team leaders use their experience to show employees how to reduce food waste. This finding aligns with those of Dreyfus and Dreyfus (1986), that experience is commonly used by experts when

teaching newcomers about organisational practices, and of Lave and Wenger (1991) that learning around a specific activity happens best in groups or teams.

The last section of the findings focused on challenges faced by newcomers, experts, sustainability trainers and management in the food processing company. It was discovered that employees work under pressure and time constraints, leading in the dropping of pots that result in food waste. This aligns with the claim by Hailu (2021) that working under pressure and meeting set times to meet the production plans is one of the challenges that results in food waste at the company studied. By implication, as employees continue to work under pressure and at set times, food waste reduction is unlikely to be minimised. It was also discovered that there are no structured learning arrangements on how to reduce food waste, and employees continue to learn reactively. This contradicts the finding of Salman (2021) that food processing companies use structured programs to teach their employees about food waste. Employees failure to recognise the value of work-based learning about food waste was found to be one of the challenges in organising and facilitating the learning about food waste. This finding found to be related to what was discovered by Atkinson (2016) that employers lack interest in recognising the importance of work-based learning. By implication, as long as employers lack interest in sustainability training, such as learning about food waste, it becomes difficult for employees to promote work-based learning about food waste.

In the next section, I discuss the framework of analysis used to understand the dimensions of situated learning in a Gauteng food processing company.

5.2.3 A framework for analysing employees` learning about food waste when commercially processing food.

The research focused on exploring how employees learn about food waste by considering the four dimensions of situated learning described by Lave and Wenger (1991). The first dimension relates to the roles and responsibilities of newcomers, experts, management and sustainability trainers. The second dimension relates to the types of relationships between newcomers, experts, sustainability trainers and management. The third dimension relates to the evidence of collaboration between newcomers, experts, sustainability trainers and management. This dimension relates to the examples of mediations between newcomers, experts, management team, and sustainability trainers. The fourth dimension relates to the challenges faced by newcomers, experts, sustainability trainers and management when processing food. The four-dimensional analysis links learning about food waste to employees' food waste knowledge,

work-based opportunities for learning about food waste, how the learning about food waste is organised and facilitated, and challenges faced when organising and facilitating work-based learning about food waste. Understanding employees' learning about food waste in this way is useful for obtaining perspective on transitioning to a sustainable food system.

The analytic framework enabled the identification of several issues in relation to employees learning about food waste in a food processing company. It revealed that while there are opportunities available for employees to learn about food waste, these opportunities are often used for other sustainability issues such as food safety and health with food waste partially included. The analysis showed that there are no structured programmes for learning about food waste, and issues of food waste are managed reactively and not proactively. Furthermore, there is no signage or posters on food waste in the plant; all posters are on food safety and health. These findings suggest that there are low levels of food waste awareness in the plant. Worth noting is the degree of collaboration between participants in the study. Data showed that employees come together and interact when learning about food waste reactively.

I now turn to the limitations of this study and indicate how they were addressed.

5.3 Limitations to the study

The main limitation of this study was the degree of discomfort from employees in providing some of the information requested. There was a degree of sensitivity in terms of the questions asked in relation to what they thought were issues causing food waste. Employees thought their responses could result in job losses as they unpacked some of the issues that could be affecting the company`s profits. However, by assuring them of issues of anonymity and confidentiality, I managed to overcome the limitation. Despite this, a limitation of this study is getting the participants, at least partially newcomers who are general workers, to give their opinions on the types of work-based opportunities to learn about food waste. I acknowledge that the study was limited to a single food processing company in Gauteng Province, and I state that the findings cannot be generalised to other food processing companies in South Africa. I also acknowledge the sample size of the study. However, qualitative research does not aim to use representative samples or to produce generalisable findings but to generate an in-depth understanding of a phenomenon and explore transferability to other contexts (Lewis et al. 2003). As a result, future studies using both qualitative and quantitative methods should be

conducted to confirm or build on this current research. Thus, in the next section, I suggest areas for future research.

5.4 Suggestions for future research

Based on the findings of this study, the following are suggestions for future research on employee learning about food waste to transition to a sustainable food system. Firstly, reiterating the fact that the sample size was small, it would be useful to conduct research that looks into multiple large food processing companies and increase the sample size to gain a better understanding of how employees learn about food waste. Secondly, this study only focused on a food processing stage in transitioning to a food system that is sustainable. Following this, a study focusing on other stages of the South African food value chain is critical. Lastly, based on the fact that almost 100% of the participants indicated that structured learning on how to reduce food waste when commercially processing food might change employees' behaviour, further research on how structured ways of learning about food waste can change employees' behaviour is urgently needed. In the next section, I discuss some of the recommendations alluded to by the participants for how and what employees' learning about food waste can be introduced.

5.5 Recommendations

This study recommends that there should be structured learning on how to reduce food waste when employees are commercially processing food. In structuring the learning about food waste, the sustainability department should develop learning materials. These learning materials on food waste should include all South African official languages so that all employees can better understand the learning in their own language. Another important element when developing a context is including at least individuals who are multilingual and understand almost all the South African languages. This will make learning easier for employees who do not understand English, which is commonly used to teach employees. Lastly, there should be more awareness about food waste by placing signage within the food processing plant indicating how food waste can be reduced during food processing. This will bring more awareness about food waste in the processing plant.

Now that I have provided recommendations based on this study, in the final section I conclude the study.

5.6 Conclusion

This study was undertaken to explore how employees learn about food waste at a food processing company in Gauteng Province, South Africa. The research adopted a qualitative methodology. The literature reviewed on work-based learning included that of Lave and Wenger (1991) on situated learning. The four dimensions of the situated learning framework provided the structure for the examination of literature and the analysis of data. In answering the research questions, the analysis of situated learning provided clarity on employees' knowledge about food waste, opportunities available and missing in learning about food waste, how learning about food waste is organised and facilitated, and challenges faced in organising and facilitating the learning about food waste. An interesting result of the analysis was how "reactive learning" is commonly used to facilitate learning about food waste in the food processing plant. From the analysis, it is evident that there is a lack of structured learning on how to reduce food waste when commercially processing food. Again, employees working in the processing of food do not connect food waste with the work that they do. With these two findings, it is evident that there is a need for structured learning about food waste to transit to a food system that is sustainable. I conclude with a recommendation from Department of Environment, Forestry and Fisheries and Council for Scientific and Industrial Research (2019): reducing food waste should start by providing education, training, and skills to employees on how to reduce food waste in food processing companies.

6. References

Abdul Rahim, F., Hood, P., & Coyle, D. (2009). 'Becoming experts': Learning through mediation. *Malaysian Journal of Learning & Instruction, 6,* 1–21. Available at [https://repo.uum.edu.my/id/eprint/208/].

AgriSeta. (2019). Agriculture sector skills plan 2020-2025. Enabling a skilled and prosperous agricultural sector. Available at [https://www.agriseta.co.za/wp-content/uploads/2021/02/Agriseta-Agriculture-SSP_DIGITAL.pdf].

Aliber, M. (2009). Exploring Statistics South Africa's national household surveys as sources of information about household-level food security. Agrekon, 48(4), 384–409. Available at [https://doi.org/10.1080/03031853.2009.9523833].

Allais, S., Schoer, V., Marock, C., Kgalema, V., Ramulongo, N., & Sibiya, T. (2021). Rethinking 'supply and demand'of technical and vocational education and training: Insights from a company survey in three manufacturing sectors in South Africa. *Journal of Education and Work*, *34*(5–6), 649–662. Available at [https://www.tandfonline.com/doi/abs/10.1080/13639080.2021.1967302].

Anderson, J. R., Reder, L. M., & Simon, H. A. (1996). Situated learning and education. *Educational Researcher*, *25*(4), 5–11. Available at [https://journals.sagepub.com/doi/abs/10.3102/0013189X025004005].

Anvik, C., Vedeler, J. S., Wegener, C., Slettebø, Å., & Ødegård, A. (2020). Practice-based learning and innovation in nursing homes. *Journal of Workplace Learning*. Available at [https://www.emerald.com/insight/content/doi/10.1108/JWL-09-2019-0112/full/html].

Aschemann-Witzel, J., De Hooge, I., & Normann, A. (2016). Consumer-related food waste: Role of food marketing and retailers and potential for action. *Journal of International Food & Agribusiness Marketing*, *28*(3), 271–285. Available at [https://www.tandfonline.com/doi/abs/10.1080/08974438.2015.1110549].

Atkinson, G. (2016). Work-Based Learning and Work-Integrated Learning: Fostering Engagement with Employers. ERIC. Available at [https://apo.org.au/node/66788].

Avis, J. (2010). Workplace learning, knowledge, practice and transformation. *Journal for Critical Education Policy Studies (JCEPS)*, *8*(2). Available at [https://www.researchgate.net/profile/JamesAvis/publication/228888425_Workplace_learning_knowledge_practice_and_transformation/links/545c9e310cf27487b44b968d/Workplace-learning-knowledge-practice-and-transformation.pdf].

Bailey, T. R., Hughes, K. L., & Moore, D. T. (2003). Working knowledge: Work-based learning and education reform. Routledge. Available at [https://www.taylorfrancis.com/books/mono/10.4324/9780203463956/working-knowledge-thomas-bailey-david-thornton-moore-katherine-hughes].

Balcom, S., Doucet, S., & Dubé, A. (2021). Observation and institutional ethnography: Helping us to see better. *Qualitative Health Research*, *31*(8), 1534–1541. Available at [https://journals.sagepub.com/doi/abs/10.1177/10497323211015966].

Barab, S. A., & Plucker, J. A. (2002). Smart people or smart contexts? Cognition, ability, and talent development in an age of situated approaches to knowing and learning. *Educational Psychologist*, *37*(3), 165–182. Available at [https://www.tandfonline.com/doi/abs/10.1207/S15326985EP3703_3].

Barnett, L. A. (2007). The nature of playfulness in young adults. *Personality and Individual Differences*, *43*(4), 949–958. Available at [https://www.sciencedirect.com/science/article/pii/S0191886907000633].

Beckett, D., & Hager, P. (2000). Making judgments as the basis for workplace learning: Towards an epistemology of practice. *International Journal of Lifelong Education*, *19*(4), 300–311. Available at [https://www.tandfonline.com/doi/abs/10.1080/02601370050110365].

Ben-Ari, M. (2005). Situated learning in ‘this high-technology world’. *Science & Education*, *14*, 367–376. Available at [https://link.springer.com/article/10.1007/s11191-004-7934-1].

Berragan, L. (2011). Simulation: An effective pedagogical approach for nursing? *Nurse Education Today*, *31*(7), 660–663. Available at [https://www.sciencedirect.com/science/article/pii/S0260691711000384].

Betz, A., Buchli, J., Göbel, C., & Müller, C. (2015). Food waste in the Swiss food service industry–Magnitude and potential for reduction. *Waste Management*, *35*, 218–226. Available at [https://www.sciencedirect.com/science/article/pii/S0956053X14004371].

Billet, S. (1999). Guided Learning at Work in Bound and Garrick eds 1999 Understanding Learning at Work. Available at [https://www.academia.edu/16716389/Understanding_learning_at_work].

Billett, S. (1994). Situated learning: A workplace experience. [Developed from a conference paper presented at the "After Competence" Conference (1993: Brisbane)]. *Australian Journal of Adult and Community Education*, *34*(2), 112–130. Available at [https://search.informit.org/doi/pdf/10.3316/ielapa.950302159].

Billett, S. (1995). Workplace learning: Its potential and limitations. *Education+Training*. Available at [https://www.emerald.com/insight/content/doi/10.1108/00400919510089103/full/html].

Billett, S. (1998). Constructing vocational knowledge: Situations and other social sources. *Journal of Education and Work*, *11*(3), 255–273. Available at [https://www.tandfonline.com/doi/abs/10.1080/1363908980110303].

Billett, S. (2001). Learning through work: Workplace affordances and individual engagement. *Journal of Workplace Learning*, *13*(5), 209–214. Available at [https://www.emerald.com/insight/content/doi/10.1108/EUM0000000005548/full/html].

Billett, S. (2020). Learning in the workplace: Strategies for effective practice. Routledge. Available at [https://books.google.com/books?hl=en&lr=&id=3SfxDwAAQBAJ&oi=fnd&pg=PT8&dq=Billett,+S.+(2020).+Learning+in+the+workplace:+Strategies+for+effective+practice.+Routledge.&ots=CbTzhn0fRk&sig=ALpsVpQcLgM3E_imWW9SfNkIx0A].

Black, A., Craig, S., & Dunne, P. (2016). Capital intensity, industrial policy and employment in the South African manufacturing sector. *REDI3x3 Working Paper 23*. Available at [http://www.redi3x3.org/sites/default/files/Black%20et%20al%202016%20REDI3x3%20Working%20Paper%2023%20Capital%20intensity%20and%20employment%20FINAL_0.pdf].

Boud, D., Garrick, J., & Greenfield, K. (2000). Understanding learning at work. *Performance Improvement*, *39*(10), 45–47. Available at [https://onlinelibrary.wiley.com/doi/abs/10.1002/pfi.4140391013].

Boud, D., & Symes, C. (2002). Learning for Real: Work-based. *Working Knowledge*, 14. Available at [https://books.google.com/books?hl=en&lr=&id=YbZEBgAAQBAJ&oi=fnd&pg=PA14&dq=Boud,+D.,+%26+Symes,+C.+(2002).+Learning+for+Real:+Work-based.+Working+Knowledge,+14.&ots=Hu8XJ1WYXb&sig=A5F2nsZFTBkCGlM7K4A_mq4YrEQ].

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational researcher*. *18(1)*, 32–42. Available at [https://library.oapen.org/bitstream/handle/20.500.12657/24125/1/1006006.pdf#page=313].

Buhalis, D., & O'Connor, P. (2005). Information communication technology revolutionizing tourism. *Tourism Recreation Research, 30*(3), 7–16. Available at [https://www.tandfonline.com/doi/abs/10.1080/02508281.2005.11081482].

Buzby, J. C., & Hyman, J. (2012). Total and per capita value of food loss in the United States. *Food Policy*, *37*(5), 561–570. Available at [https://www.sciencedirect.com/science/article/pii/S0306919212000693].

Casey, C. (1995). *Work, Self and Society: After Industrialism*. London: Routledge. Available at [https://www.taylorfrancis.com/books/mono/10.4324/9780203444993/work-self-society-catherine-casey].

Chisholm, C., Harris, M., Northwood, D., & Johrendt, J. (2009). The characterisation of work-based learning by consideration of the theories of experiential learning. *European Journal of Education*, *44*(3), 319–337. Available at [https://www.jstor.org/stable/27743176].

Chisoro-Dube, S., Nair, R. D., & Landani, N. (2019). Technological developments in South Africa's fruit industry and implications for market access and participation.'. CCRED Working Paper 2019/5. Johannesburg: CCRED. Available at [https://www.competition.org.za/working-papers].

Chitonge, H. (2021). The Agro-processing Sector in the South African Economy: Creating Opportunities for Inclusive Growth. Available at [https://webcms.uct.ac.za/sites/default/files/image_tool/images/524/Papers/PRISM%20Working%20Paper%202021-4%20-%20Chitonge.pdf].

Consumer Goods Council of South Africa. (2022). Food loss and waste. Available at: [https://www.cgcsa.co.za/service-offering/food-safety-initiative/food-loss-and-waste/].

Cope, P., Cuthbertson, P., & Stoddart, B. (2000). Situated learning in the practice placement. *Journal of Advanced Nursing*, *31*(4), 850–856. Available at [https://onlinelibrary.wiley.com/doi/abs/10.1046/j.1365-2648.2000.01343.x].

Demirbas, A. (2011). Waste management, waste resource facilities and waste conversion processes. *Energy Conversion and Management*, *52*(2), 1280–1287. Available at [https://www.sciencedirect.com/science/article/pii/S0196890410004279].

Department of Agriculture, Land Reform and Rural Development. (2021). *Agro-processing Support*. Available at [https://www.dalrrd.gov.za/Branches/Economic-Development-Trade-Marketing/Agro-processing-support#:~:text=The%20manufacturing%20sector%20accounted%20for%2011%2C7%25%20of%20South,by%20the%20agro-processing%20industry%20%28Statistics%20South%20Africa%2C%202021%29].

Department of Environment, Forestry and Fisheries and Council for Scientific and Industrial Research. (2019). Food waste prevention & management: Guideline for South Africa. Edition 1, DEFF & CSIR, Pretoria. Available at [https://www.csir.co.za/sites/default/files/Documents/Food%20waste%20prevention_LANDSCAPE%28EDMS%29%20-%2005-02-2021.pdf].

Dreyfus, H., & Dreyfus, S. (1986). With Athanasiou T. Mind over Machine: The Power of Human Intuition and Expertise in the Era of the Computer Oxford: Basil Blackwell. Available at [https://www.scirp.org/(S(vtj3fa45qm1ean45vvffcz55))/reference/ReferencesPapers.aspx?ReferenceID=102308].

Dubey, S., Singh, P., Yadav, P., & Singh, K. K. (2020). Household waste management system using IoT and machine learning. *Procedia Computer Science*, *167*, 1950–1959. Available at [https://www.sciencedirect.com/science/article/pii/S1877050920306876].

Edwards, L., Flowerday, W., Rankin, N., Roberts, G., & Schoer, V. (2015). South Africa Country Report, Swiss Programme for Research on Global Issues for Development. R4D Working Paper 2015/4. Available at [https://www.r4d.ch/SiteCollectionDocuments/r4d%20EM%20Synthesis%20Paper_Achieving%20SDGs%20through%20Industrialization%20while%20realizing%20the%20Demographic%20Dividend.pdf].

Engeström, Y. (1993). Developmental studies of work as a testbench of activity theory: The case of primary care medical practice. Understanding Practice: Perspectives on Activity and Context, 64–103. Available at [https://www.cambridge.org/core/services/aop-cambridge-core/content/view/B53658D8ABBD3CBFB283C609A53387B7].

Engeström, Y. (2001). Expansive learning at work: Toward an activity theoretical reconceptualization. *Journal of Education and Work*, *14*(1), 133–156. Available at [https://www.tandfonline.com/doi/abs/10.1080/13639080020028747].

Fenwick, T. J. (2002). Lady, Inc.: Women learning, negotiating subjectivity in entrepreneurial discourses. *International Journal of Lifelong Education*, *21*(2), 162–177. Available at [https://www.tandfonline.com/doi/abs/10.1080/02601370110111718?casa_token=SoSDpBGZdA8AAAAA:9gNnn-uoED_2beyYKWRYBsDNxsyj2vTP13C6ap-vVm72IjXnYzzoOaIB_v2_FDZ4Eha-wZ0nY6pCTko].

Flanagan, J., Baldwin, S., & Clarke, D. (2000). Work-based learning as a means of developing and assessing nursing competence. *Journal of Clinical Nursing*, *9*(3), 360–368. Available at [https://onlinelibrary.wiley.com/doi/abs/10.1046/j.1365-2702.2000.00388.x?casa_token=zghK9Ql1QKQAAAAA:KgDy0HnxtXj5HKe7FFj3ui3ZbW8FlPM1jztRmSCYuyQ5hhySBzDwMXjGu_8XtxYwdl3vAY11ig3n3Qbt].

Food Agricultural Organisation. (2013). Food Wastage Footprint: Impacts on Natural Resources. Available at [https://www.fao.org/3/i3347e/i3347e.pdf].

Food and Agriculture Organization. (1981). Food Loss Prevention in Perishable Crops [FAO Agricultural Service Bulletin, 43, FAO Statistics Division (1981)]. Available at [https://www.fao.org/3/s8620e/s8620e00.htm].

Fuller, A., Hodkinson, H., Hodkinson, P., & Unwin, L. (2005). Learning as peripheral participation in communities of practice: A reassessment of key concepts in workplace learning. *British Educational Research Journal*, *31*(1), 49–68. Available at [https://bera-journals.onlinelibrary.wiley.com/doi/abs/10.1080/0141192052000310029?casa_token=rEy17pSvtP0AAAAA:Ql4xt-rWc-hcznYU0j8lWBm0C2qNRrsIxoJhX-sGFRE2Ry6gNAt81BcSdtqP2_uCCsamnbPMnpA-ZsF-].

Fuller, A., & Unwin, L. (2004). Young people as teachers and learners in the workplace: Challenging the novice–expert dichotomy. *International Journal of Training and Development*, *8*(1), 32–42. Available at [https://onlinelibrary.wiley.com/doi/abs/10.1111/j.1360-3736.2004.00194.x?casa_token=XFBvGfptd5MAAAAA:tFs00cJeIrTnRU1hTVqd2C8T1TavnFrd-QQTaoOPdv48klX0BYvAhWsE2eCF-k6AEGyDpXPDb_6wa6d-].

Fuller, A., & Unwin, L. (2005). Older and wiser? Workplace learning from the perspective of experienced employees. *International Journal of Lifelong Education*, *24*(1), 21–39. Available at [https://www.tandfonline.com/doi/abs/10.1080/02603704200031732 9?casa_token=rQ3I9f-n0nwAAAAA:YTC9nREWy4WE1hjokOmHRn-k7_paHdIWjhhZWMhqpG6lrP1f4A38dBL1kAEU6E1wQtB6pStqriSqzvs].

Garnett, T. (2016). Plating up solutions. *Science*, *353*(6305), 1202–1204. Available at [https://pubmed.ncbi.nlm.nih.gov/27634509/].

Gergen, K. J. (1994). Exploring the postmodern: Perils or potentials? *American Psychologist*, *49*(5), 412. Available at [https://www.science.org/doi/abs/10.1126/science.aah4765?casa_token=3m5tKXIFLe

IAAAAA:pdD5IjwJHf5lpp8PLYDp6q2I8uYHN9wf8ePI_LjlU-R3fmqg09NIpps4OrmwmAONGfksMNHVU4EAUqe6].

Gott, S. P. (1995). Rediscovering learning: Acquiring expertise in real-world problem-solving tasks. *Australian and New Zealand Journal of Vocational Education Research*, *3*(1), 30–68. Available at [https://search.informit.org/doi/abs/10.3316/aeipt.84629].

Greenberg, S., University of the Western Cape, & Programme for Land and Agrarian Studies. (2010). *Contesting the food system in South Africa: Issues and opportunities*. Programme for Land and Agrarian Studies (PLAAS), School of Government, University of the Western Cape. Available at [https://repository.uwc.ac.za/handle/10566/4487].

Guile, D., & Young, M. (1998). Apprenticeship as a conceptual basis for a social theory of learning. *Journal of Vocational Education & Training*, *50*(2), 173–193. Available at [https://www.tandfonline.com/doi/abs/10.1080/13636829800200044].

Hailu, G. (2021). COVID-19 and food processing in Canada. *Canadian Journal of Agricultural Economics/Revue Canadienne d'agroeconomie*, *69*(2), 177–187. Available at [https://www.tandfonline.com/doi/abs/10.1080/13636829800200044].

Hanson, C., & Mitchell, P. (2017). The business case for reducing food losses and waste. A report on behalf of Champions 12.3. Available at [https://www.researchgate.net/publication/314261211_THE_BUSINESS_CASE_FOR_REDUCING_FOOD_LOSS_AND_WASTE_A_report_on_behalf_of_SDG_Champions_123].

Harris, E., & Volet, S. (1996). Developing workplace learning cultures. Available at [https://researchportal.murdoch.edu.au/esploro/outputs/conferencePaper/Developing-workplace-learning-cultures/991005546324307891].

Harris, K. (2010). Enhancing coaches' experiential learning through communities of practice' (Lave & Wenger, 1991). Available at [https://figshare.cardiffmet.ac.uk/articles/thesis/Enhancing_coaches_experiential_learning_through_communities_of_practice_Lave_Wenger_1991_/20497002].

Henning, P. H. (2004). *Everyday cognition and situated learning. Handbook of Research on Educational Communications and Technology: A Project of the Association for Educational Communications and Technology*, 829–861. Available at [https://books.google.com/books?hl=en&lr=&id=cBtAUGaPIRAC&oi=fnd&pg=PA143&dq=Henning,+P.+H.+(2004).+Everyday+cognition+and+situated+learning.+Handbook+of+Research+on+Educational+Communications+and+Technology:+A+Project+of+the+Association+for+Educational+Communications+and+Technology,+829%E2%80%93861.&ots=bbcEbiTsUA&sig=aVRAYC058PGvoL2oO7UxfPv_eNA].

Illeris, K. (2003). Workplace learning and learning theory. *Journal of Workplace Learning*. Available at [https://www.emerald.com/insight/content/doi/10.1108/13665620310474615/full/html?fullSc=1].

Industrial Development Corporation. (2016). Economic trends: Key trends in the South African economy. Available at [https://www.idc.co.za/home/media-room/articles/682-key-trends-in-the-south-african-economy,-31-march-2014.html].

Iqbal, S. (2015). Employees' perceptions of human resource management practices and knowledge sharing behaviour: A dissertation presented in partial fulfilment of the requirements for the degree of Doctor of Philosophy in human resource management (HRM) at Massey University, Palmerston North, New Zealand. Available at [https://mro.massey.ac.nz/handle/10179/6788].

Jeebhay, M. F., Robins, T. G., Lehrer, S. B., & Lopata, A. (2001). Occupational seafood allergy: A review. *Occupational and Environmental Medicine, 58*(9), 553–562. Available at [https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1740192/].

Keller, S. G. (2004). Quality management systems in small and medium food processing enterprises–experience of South Africa. Quality enhancement in food processing through HACCP. Available at [https://www.apo-tokyo.org/wp-content/uploads/2014/07/agr-14-haccp.pdf#page=46].

Khumalo, V. (2022). List Of Food Manufacturing Companies In South Africa. https://southafricalists.com/food-manufacturing-companies-in-south-africa/. Available at [https://southafricalists.com/food-manufacturing-companies-in-south-africa/].

Lave, J., & Wenger, E. (1991). *Situated Learning: Legitimate Peripheral Participation (1st ed.).* Cambridge University Press. Available at [https://books.google.com/books?hl=en&lr=&id=CAVIOrW3vYAC&oi=fnd&pg=PA11&dq=Lave,+J.,+%26+Wenger,+E.+(1991).+Situated+Learning:+Legitimate+Peripheral+Participation+(1st+ed.).+Cambridge+University+Press.+&ots=ODtBunYEEm&sig=pYrBQCTjSM59cHsKLTVOU11_mic].

Le Roux, B., Van der Laan, M., Vahrmeijer, T., Annandale, J. G., & Bristow, K. L. (2018). Water footprints of vegetable crop wastage along the supply chain in Gauteng, South Africa. *Water*, *10*(5), 539. Available at [https://www.mdpi.com/2073-4441/10/5/539].

Lewis, J., Ritchie, J., Ormston, R., & Morrell, G. (2003). Generalising from qualitative research. *Qualitative Research Practice: A Guide for Social Science Students and Researchers*, *2*(347–362). Available at [https://books.google.com/books?hl=en&lr=&id=EQSIAwAAQBAJ&oi=fnd&pg=PP1&dq=Lewis,+J.,+Ritchie,+J.,+Ormston,+R.,+%26+Morrell,+G.+(2003).+Generalising+from+qualitative+research.+Qualitative+Research+Practice:+A+Guide+for+Social+Science+Students+and+Researchers,+2(347%E2%80%93362)&ots=l-YPjpSq7R&sig=32uFIq6tw-P4TGst68Jeiz1AlGA].

Lipinski, B., Hanson, C., Lomax, J., Kitinoja, L., Waite, R., & Searchinger, T. (2013). Reducing food loss and waste. Working paper, installment 2 of creating a sustainable

food future. *World Resources Institute,* Washington, DC. Available at [https://www.wri.org/research/reducing-food-loss-and-waste?page=1].

Lotz-Sisitka, H., Ward, M., Jenkin, N., & Tantsi, T. (2019). Food for us: Reducing food waste, supporting social learning, creating value. Available at [http://vital.seals.ac.za:8080/vital/access/manager/Repository/vital:29754].

Lunce, L. M. (2006). Simulations: Bringing the benefits of situated learning to the traditional classroom. *Journal of Applied Educational Technology*, *3*(1), 37–45. Available at [https://researchportal.murdoch.edu.au/esploro/outputs/conferencePaper/Developing-workplace-learning-cultures/991005546324307891].

Matthews, P. (1999). Workplace learning: Developing a holistic model. *The Learning Organisation*. Available at [https://www.emerald.com/insight/content/doi/10.1108/09696479910255684/full/html?casa_token=-0526QlN-NsAAAAA:3f3s0gdPSftKvVcJEQk2eCtUp7hS9Y3_WxMGMLh2WXi0Amt_YUntZLGNBQM6jka9us1xAEVk1Jw7NqzFkqXJzvSuIfPHiFlq9eBHCTp0CQ1zGP25v63-7A].

McCowan, T., & Unterhalter, E. (Eds.). (2015). Education and international development: An introduction. Bloomsbury Academic. Available at [https://www.tandfonline.com/doi/abs/10.1080/0142159X.2018.1497149].

McGrath, C., Palmgren, P. J., & Liljedahl, M. (2019). Twelve tips for conducting qualitative research interviews. *Medical Teacher*, *41*(9), 1002–1006. Available at [https://www.tandfonline.com/doi/abs/10.1080/0142159X.2018.1497149].

McLellan, H. (1996). Situated learning: Multiple perspectives. Situated Learning Perspectives, 5–17. Available at [https://cir.nii.ac.jp/crid/1572824499552428416].

Messmann, G., & Mulder, R. H. (2015). Reflection as a facilitator of teachers' innovative work behaviour. *International Journal of Training and Development*, *19*(2), 125–137. Available at [https://onlinelibrary.wiley.com/doi/abs/10.1111/ijtd.12052?casa_token=wDE0NH6Sb7sAAAAA:KHUEGKNXHj5iSAYDFhfmyoWlZeGh0mrm_pxslYFInaQgLVAL2_HquzGWCx79Li7fS8nx313_mNZWx0Ns].

Miettinen, R., Samra-Fredericks, D., & lave, D. (2009). Re-turn to practice. Special Issue, Organisation Studies, 184. Available at [https://journals.sagepub.com/doi/abs/10.1177/0170840609349860?casa_token=_1yU-2-27jcAAAAA:d0rul1y2VMQrdKQMUm47WuX8Pix5jJkyOjUq4UavBKZrzB1rIfMnvTcsZYbacoIMKGK7l_Vz4L7Cvgs].

Miles, M. B. (1979). Qualitative data as an attractive nuisance: The problem of analysis. *Administrative Science Quarterly*, *24*(4), 590–601. Available at [https://www.jstor.org/stable/2392365?casa_token=ZTe3gLtbB8oAAAAA:m4sk5hZr5aa5y4T8f_zRkVqT1GJ7rkufu7xy-gIbRw_HSZGcWqnvslisvMgM2QdSpxPwjXOK0rQuwjiL9lB5qwONErQEg3DhOZ03msgTlpib9JvrXPO5cA].

Moon, J., & Orlitzky, M. (2011). Corporate social responsibility and sustainability education: A trans-Atlantic comparison. *Journal of Management & Organisation*, *17*(5), 583–603. Available at [https://www.cambridge.org/core/journals/journal-of-management-and-organization/article/corporate-social-responsibility-and-sustainability-education-a-transatlantic-comparison/9A20D0A54A1DF6EB22C6F78E4504E72D].

Moore, D. T. (1986). Learning at Work: Case Studies in Non-School Education. *Anthropology & Education Quarterly*, *17*(3), 166–184. Available at [https://anthrosource.onlinelibrary.wiley.com/doi/abs/10.1525/aeq.1986.17.3.04x0569w].

Nagyová, Ľ., Holienčinová, M., Košičiarová, I., & Holota, T. (2016). Corporate social responsibility in food manufacturing companies-environmental dimensions. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *64*(3), 1037–1043. Available at [https://acta.mendelu.cz/pdfs/acu/2016/03/35.pdf].

Nayak, J. K., & Singh, P. (2021). Fundamentals of research methodology problems and prospects. SSDN Publishers & Distributors. Available at [http://dspace.vnbrims.org:13000/jspui/bitstream/123456789/4653/1/Fundamentals%20of%20Research%20Methodology_Nayak.pdf].

Nayak, R., & Waterson, P. (2017). The Assessment of Food Safety Culture: An investigation of current challenges, barriers and future opportunities within the food industry. *Food Control*, *73*, 1114–1123. Available at [https://www.sciencedirect.com/science/article/pii/S0956713516305722?casa_token=czimRYZUdvgAAAAA:WfMDrq2ZfGU5yGUmr15KDLhZa51ovBMQm8KsFIvHLD92Y7-wupQiyFuZnWS2-AhTn_F3CoDBjMGv].

Nevalainen, M., Lunkka, N., & Suhonen, M. (2018). Work-based learning in health care organisations experienced by nursing staff: A systematic review of qualitative studies. *Nurse Education in Practice*, *29*, 21–29. Available at [https://www.sciencedirect.com/science/article/pii/S1471595317307928?casa_token=-Y4gkFRSphoAAAAA:5u2LU-jhDKBWAkS31wr_wO2fuAtI8WLV1Wqx0cGJPQJ1gM8oyfORyQw8iSnexO8RqphANU4Nwiez].

Nkhonjera, M., & Das Nair, R. (2018). Developing Capabilities in Mozambique's Food Processing Sector-The Role of South African Food Processing Firms and Supermarket Chains. Available at [https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3269734].

O'Brien, B. C., & Battista, A. (2020). Situated learning theory in health professions education research: A scoping review. *Advances in Health Sciences Education*, *25*(2), 483–509. Available at

[https://idp.springer.com/authorize/casa?redirect_uri=https://link.springer.com/article/10.1007/s10459-019-09900-w&casa_token=C6GlM3IojP0AAAAA:yHgmu_-sjZkiNXw3KB8SmReDHMJk72NnJuPuIperKVp2eTcoglSDtUCCZJITiXHkuMcarHejW5vBvXY80HI].

Oelofse, S. H., & Nahman, A. (2013). Estimating the magnitude of food waste generated in South Africa. *Waste Management & Research*, *31*(1), 80–86. Available at [https://journals.sagepub.com/doi/abs/10.1177/0734242x12457117?casa_token=hvZLlqVVzbAAAAAA:kLm2WHhGW41tGUHakmz8oe06uc8jhBhjF52vG6VG1FCPZEppK1QqTDbx_0udBj0o4vi3HwhmON9n_6U].

Oelofse, S., Muswema, A., & Ramukhwatho, F. (2018). Household food waste disposal in South Africa: A case study of Johannesburg and Ekurhuleni. *South African Journal of Science*, *114*(5–6), 1–6. Available at [http://www.scielo.org.za/scielo.php?pid=S0038-23532018000300011&script=sci_arttext].

Oelofse, S., Polasi, T., Haywood, L., & Musvoto, C. (2021). Increasing reliable, scientific data and information on food losses and waste in South Africa. Council for Science and Industrial Research: Pretoria. Available at [http://www.wasteroadmap.co.za/wp-content/uploads/2021/06/17-CSIR-Final_Technical-report_Food-waste.pdf].

Papargyropoulou, E., Wright, N., Lozano, R., Steinberger, J., Padfield, R., & Ujang, Z. (2016). Conceptual framework for the study of food waste generation and prevention in the hospitality sector. *Waste Management*, *49*, 326–336. Available at [https://www.sciencedirect.com/science/article/pii/S0956053X16300174?casa_token=a7DCylIcTxgAAAAA:ciNy0S9DhAEV7wWVZXXDzmJsJ5_F0zemkX42NxAqub8UOcQ0XWrir5-q6OFGu8cw8RU68XvCJ8Fy].

Parfitt, J., Barthel, M., & Macnaughton, S. (2010). Food waste within food supply chains: Quantification and potential for change to 2050. *Philosophical Transactions of the Royal Society B: Biological Sciences*, *365*(1554), 3065–3081. Available at [https://royalsocietypublishing.org/doi/10.1098/rstb.2010.0126].

Pereira, L., & Drimie, S. (2016). Governance arrangements for the future food system: Addressing complexity in South Africa. *Environment: Science and Policy for Sustainable Development*, *58*(4), 18–31. Available at [https://www.tandfonline.com/doi/abs/10.1080/00139157.2016.1186438?casa_token=Wb2PYNHB7iUAAAAA:Wmi2UGTBbvVMR-R6bTb0zi8tYfmoG7KQV77umLpTTctDnhYZtOuJF_UheXtt2-JXL0HiyiqBkIGHACA].

Pirani, S. I., & Arafat, H. A. (2016). Reduction of food waste generation in the hospitality industry. *Journal of Cleaner Production*, *132*, 129–145. Available at [https://www.researchgate.net/publication/282186237_Reduction_of_Food_Waste_Generation_in_the_Hospitality_Industry].

Raelin, J. A. (2000). Work-based learning: The new frontier of management development. Addison-Wesley. Available at [https://www.researchgate.net/publication/248467955_Work-Based_Learning_The_New_Frontier_of_Management_Development].

Raelin, J. A. (2008). Work-based learning: Bridging knowledge and action in the workplace. John Wiley & Sons. Available at [https://books.google.com/books?hl=en&lr=&id=WXpn_GRvBV4C&oi=fnd&pg=PR7&dq=Raelin,+J.+A.+(2008).+Work-based+learning:+Bridging+knowledge+and+action+in+the+workplace.+John+Wiley+%26+Sons.&ots=7-QGE5SDdD&sig=9S1jUARTPMgAwkZBxfUHHvpyqVU].

Ramukhwatho, F. R., Oelofse, S. H., Musvoto, C. D., & Polasi, L. T. (2021). Assessment of food losses and waste at the Tshwane market and small-scale farms. Research Space. Available at [http://146.64.81.179/dspace/handle/10204/12015].

Sadler-Smith, E., & J. Smith, P. (2004). Strategies for accommodating individuals' styles and preferences in flexible learning programmes. *British Journal of Educational Technology*, *35*(4), 395–412. Available at [https://bera-journals.onlinelibrary.wiley.com/doi/abs/10.1111/j.0007-1013.2004.00399.x].

Salman, Z. (2021). Waste Management in the Food Processing Industry. Available at [https://www.bioenergyconsult.com/waste-management-in-food-processing-industry/].

Samoggia, A., & Beyhan, Z. (2022). Fairness-Enabling Practices in Agro-Food Chain. *Sustainability*, *14*(11), 6391. Available at [https://www.mdpi.com/2071-1050/14/11/6391].

Schön, D. (2001). The crisis of professional knowledge and the pursuit of an epistemology of practice. Available at [https://www.jstor.org/stable/42977793].

Scribner, S. (1984). Studying working intelligence. Everyday Cognition: Its Development in Social Context, 9–40. Available at [https://cir.nii.ac.jp/crid/1571417125606002304].

Scribner, S., & Cole, M. (1973). Cognitive Consequences of Formal and Informal Education: New accommodations are needed between school-based learning and learning experiences of everyday life. *Science*, *182*(4112), 553–559. Available at [https://www.science.org/doi/pdf/10.1126/science.182.4112.553].

Shafi, A. A., Muchie, M., & Sedebo, G. T. (2022). South Africa's agro processing trade in value added, global value chains (GVCs) perspective. *African Journal of Science, Technology, Innovation and Development*, *14*(3), 852–861. Available at [https://journals.co.za/doi/abs/10.1080/20421338.2021.1908693].

Smith, T. A., & Landry, C. E. (2021). Household food waste and inefficiencies in food production. *American Journal of Agricultural Economics*, *103*(1), 4–21. Available at [https://onlinelibrary.wiley.com/doi/abs/10.1111/ajae.12145].

Statistics South Africa. (2021). Labour Market Dynamics. Available at [www.statssa.gov.za].

Stech, S. (2008). School mathematics as a developmental activity. In New directions for situated cognition in mathematics education (pp. 13–30). Springer. Available at [https://link.springer.com/chapter/10.1007/978-0-387-71579-7_2].

Sukalova, V., Stofkova, Z., & Stofkova, J. (2022). Human Resource Management in Sustainable Development. *Sustainability*, *14*(21), 14258. Available at [https://www.mdpi.com/2071-1050/14/21/14258].

Suwannaporn, P., & Speece, M. (2000). Continuous learning process in new product development in the Thai food-processing industry. *British Food Journal*. Available at [https://www.emerald.com/insight/content/doi/10.1108/00070700010348442/full/html].

Trade & Industrial Policy Strategies. (2021). Manufacturing Subsectors. Food processing. Available at [https://www.tips.org.za/images/Manufacturing_subsectors__Food_processing_2021_ .pdf].

United Nations. (2016). Goal 12–Responsible Consumption & Production–Why It Matters. Available at [https://www.un.org/sustainabledevelopment/sustainable-consumption-production].

Vermeulen, H., Kirsten, J., & Sartorius, K. (2008). Contracting arrangements in agribusiness procurement practices in South Africa. *Agrekon*, *47*(2), 198–221. Available at [https://www.tandfonline.com/doi/abs/10.1080/03031853.2008.9523797].

Vukosi, M. (2019). Implementation of Lean Production System in Gauteng Food Manufacturing Firm. Available at

[https://ujcontent.uj.ac.za/view/pdfCoverPage?instCode=27UOJ_INST&filePid=136139590007691&download=true].

Wilson, M. (2021). Why South Africa has a food waste problem and how to address it? Available at [https://retailbriefafrica.co.za/why-sa-has-a-food-waste-problem-and-how-to-address-it/].

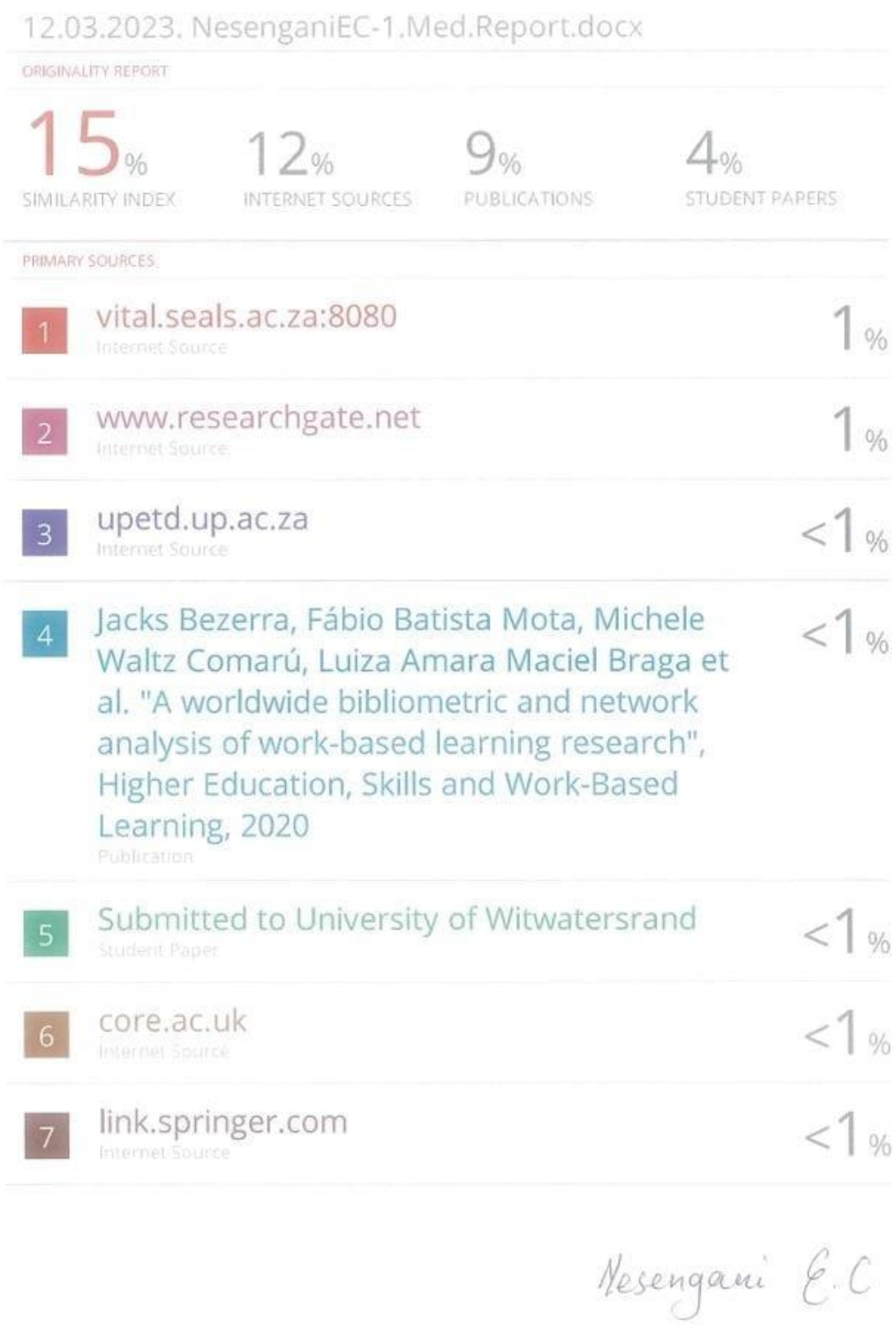
World Wide Fund for Nature (WWF). (2017). Food Loss and Waste: Facts and Futures. Available at [http://awsassets.wwf.org.za/downloads/WWF_Food_Loss_and_Waste_WEB.pdf].

Yeh, T.M., Pai, F.Y., & Yang, C.C. (2010). Performance improvement in new product development with effective tools and techniques adoption for high-tech industries. *Quality & Quantity*, *44*(1), 131–152. Available at [https://link.springer.com/article/10.1007/s11135-008-9186-7].

Yiannas, F. (2008). Food safety culture: Creating a behavior-based food safety management system. Springer Science & Business Media. Available at [https://books.google.com/books?hl=en&lr=&id=KTKKOPkH3vMC&oi=fnd&pg=PP2&dq=+Yiannas,+F.+(2008).+Food+safety+culture:+Creating+a+behavior-based+food+safety+management+system.+Springer+Science+%26+Business+Media.&ots=fAWmng22jQ&sig=0FRa-rUPCo9pc8WFSy8H-mQp1pM].

ANNEXURES

Annexture 1: Plagiarism submission report/form



12.03.2023. NesenganiEC-1.Med.Report.docx

ORIGINALITY REPORT

15%	12%	9%	4%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	vital.seals.ac.za:8080 Internet Source	1%
2	www.researchgate.net Internet Source	1%
3	upetd.up.ac.za Internet Source	<1%
4	Jacks Bezerra, Fábio Batista Mota, Michele Waltz Comarú, Luiza Amara Maciel Braga et al. "A worldwide bibliometric and network analysis of work-based learning research", Higher Education, Skills and Work-Based Learning, 2020 Publication	<1%
5	Submitted to University of Witwatersrand Student Paper	<1%
6	core.ac.uk Internet Source	<1%
7	link.springer.com Internet Source	<1%

Nesengani E.C

Annexture 2: Permission letter

LETTER EXPLAINING RESEARCH QUESTIONS AND REQUESTING PERMISSION TO CONDUCT RESEARCH

University of the Witwatersrand
School of Education
Tel: 0117173221
Email: catherine.monyane@wits.ac.za

The Head
27 June 2022

Dear:

Subject: Permission to conduct research at the large food processing company

My name is Nesengani Elelwani Clinton, I am studying for a Master of Education specialising in Education and Work in the School of Education at the University of the Witwatersrand. I am seeking permission to do research at your company.

I am conducting research on 'Exploring how employees learn about food waste in a food processing company in Gauteng'. Part of literature indicates that too much food is wasted along the food processing stage in both South Africa and Gauteng, and efforts to reduce food waste should focus on this stage. Research further indicates that not much is known as to how employees learn about food waste in South Africa. Therefore, finding out how employees learn about food waste during food processing becomes an important educational priority. I have chosen In2food because it is the largest food processing plant in both Gauteng and South Africa, and form as the best point of data collection for this study. However, data that is available on how employees in other food processing plants learn how to reduce food waste will be used to justify the study.

The research will entail collecting data from experts, newcomers, and management within the food processing plant.

I will invite individuals from your organisation to participate in this study. If they agree, they will be asked to be interviewed and answer questions for at least 30 minutes each. Data will be collected within the premises during working hours. A consent will be asked from the participants if they feel comfortable to be audio recorded. I will also conduct an on-site observation and observe how employees process food waste to identify what they know about food waste.

Participants will be asked to give their written consent before the research begins. Their responses will be treated confidentially, and identities (their names and the name of the organisation) will be anonymous unless otherwise expressly indicated. Individual privacy will be maintained in all published and written data resulting from the study.

The results will be communicated in a Master`s report paper and the name 'In2food' company will not be referenced in the paper or any publication but will be referred to as 'the large well-established company'.

The research participants will not be advantaged or disadvantaged in any way. They will be reassured that they can withdraw their permission at any time during this project without any penalty. There are no foreseeable risks in participating in this study. The participants will not be paid for this study.

All research data will be stored and saved in an encrypted storage device.

I, therefore, request permission in writing to conduct my research at your organisation. The permission letter should be on your organisation's headed paper, signed and dated, and specifically referring to myself by name and the title of my study.

Please let me know if you require any further information. I look forward to your response as soon as is convenient.

Yours sincerely
Elelwani Clinton Nesengani
Cell: 0827958250
2619760@students.wits.ac.za

Annexture 3: Consent form

CONSENT FORM FOR MANAGEMENT

Title of project: Exploring how employees learn about food waste in a food processing company in Gauteng.
Name of researcher: Elelwani Clinton Nesengani

I, ……..., agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES	NO
I understand that I can volunteer to take part in the study	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that direct quotations from my interview may be used by the researcher in their research report	YES	NO
I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report	YES	NO
I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	YES	NO

…… (signature)
…… (name of participant)
…… (date)

…… (signature)
…… (name of researcher/person seeking consent)
…… (date)

Annexture 4: Consent form

CONSENT FORM FOR EMPLOYEES (NEWCOMERS)

Title of project: Exploring how employees learn about food waste in a food processing company in Gauteng.
Name of researcher: Elelwani Clinton Nesengani

I, ……..., agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES	NO
I understand that I can volunteer to take part in the study	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that direct quotations from my interview may be used by the researcher in their research report	YES	NO
I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report	YES	NO
I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	YES	NO

…… (signature)
…… (name of participant)
…… (date)

…… (signature)
…… (name of researcher/person seeking consent)
…… (date)

Annexture 5: Consent form

CONSENT FORM FOR EMPLOYEES (EXPERTS)

Title of project: Exploring how employees learn about food waste in a food processing company in Gauteng.
Name of researcher: Elelwani Clinton Nesengani

I, ……..., agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES	NO
I understand that I can volunteer to take part in the study	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that direct quotations from my interview may be used by the researcher in their research report	YES	NO
I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report	YES	NO

I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	YES	NO

…… (signature)
…… (name of participant)
…… (date)

…… (signature)
…… (name of researcher/person seeking consent)
…… (date)

Annexture 6: Consent form

CONSENT FORM FOR SUSTAINABILITY TRAINERS

Title of project: Exploring how employees learn about food waste in a food processing company in Gauteng.
Name of researcher: Elelwani Clinton Nesengani

I, ……..., agree to participate in this research project.

I agree to the following:

(Please circle the relevant options below)

The research study was explained to me. I understand what this study is about.	YES	NO

I understand that I can volunteer to take part in the study	YES	NO
I agree that the interview may be audio recorded	YES	NO
I agree that direct quotations from my interview may be used by the researcher in their research report	YES	NO
I agree that my participation will remain anonymous (my name will not be used by the researcher in their research report	YES	NO
I agree that other researchers may use the information I provide in my interview (depending on their own ethics clearance being obtained) but my name and any personal information will not be used or passed on	YES	NO

…… (signature)
…… (name of participant)
…… (date)

…… (signature)
…… (name of researcher/person seeking consent)
…… (date)

Annexture 7: Participant information sheet

PARTICIPANT INFORMATION SHEET – EMPLOYEES (NEWCOMERS)

Dear Sir / Madam

My name is Elelwani Clinton Nesengani. I am a Master`s student (2619760) in Master of Education specialising in Education and Work at the University of the Witwatersrand, Johannesburg. My supervisor is Dr Presha Ramsarup and co-supervised by Dr Nicola Jenkin. I am conducting a research study about learning how to reduce food wate in a food processing company. The study title is exploring how employees learn about food waste in a food processing company in Gauteng.

I am inviting you to participate in an interview in this study. Your participation in this interview will take about 25-30 minutes. The interview will take place at the In2food processing plant during working hours. Permission has been granted by the management team.

With your permission, I would like to audio record the interview. This data will be stored in an encrypted storage device. I am the only person who will have access to the data.

The interview data will be reported to maintain confidentiality and all participants will be anonymous.

If you decide to take part in the research study, it should be on a voluntary basis. You can stop participating in the study at any time. You do not have to answer any questions if you do not want to. You will not get any direct benefits if you choose to join the research study. You will not lose any services, benefits, or rights you would normally have if you decided not to join. Taking part in the research study will not cost you anything. You will not be paid for being in this research study.

This research study will be written up as a research report. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me or my supervisor on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Annexture 8: Participant information sheet

PARTICIPANT INFORMATION SHEET – EMPLOYEES (EXPERTS)

Dear Sir / Madam

My name is Elelwani Clinton Nesengani. I am a Master`s student (2619760) in Master of Education specialising in Education and Work at the University of the Witwatersrand, Johannesburg. My supervisor is Dr Presha Ramsarup and co-supervised by Dr Nicola Jenkin. I am conducting a research study about learning how to reduce food wate in a food processing company. The study title is exploring how employees learn about food waste in a food processing company in Gauteng.

I am inviting you to participate in an interview in this study. Your participation in this interview will take about 25-30 minutes. The interview will take place at the In2food processing plant during working hours. Permission has been granted by the management team.

With your permission, I would like to audio record the interview. This data will be stored in an encrypted storage device. I am the only person who will have access to the data.

The interview data will be reported to maintain confidentiality and all participants will be anonymous.

If you decide to take part in the research study, it should be on a voluntary basis. You can stop participating in the study at any time. You do not have to answer any questions if you do not want to. You will not get any direct benefits if you choose to join the research study. You will not lose any services, benefits, or rights you would normally have if you decided not to join. Taking part in the research study will not cost you anything. You will not be paid for being in this research study.

This research study will be written up as a research report. If you would like to receive a summary of this report, I will be happy to send it to you.

If you have any questions during or afterwards about this research study, feel free to contact me or my supervisor on the details listed below. If you have any concerns or complaints about the ethical procedures of this research study, you are welcome to contact the University Human Research Ethics Committee (Non-Medical), telephone +27(0) 11 717 1408, email hrecnon-medical@wits.ac.za.

Annexture 9: Participant information sheet

PARTICIPANT INFORMATION SHEET – SUSTAINABILITY TRAINERS

Dear Sir / Madam

My name is Elelwani Clinton Nesengani. I am a Master`s student (2619760) in Master of Education specialising in Education and Work at the University of the Witwatersrand, Johannesburg. My supervisor is Dr Presha Ramsarup and co-supervised by Dr Nicola Jenkin. I am conducting a research study about learning how to reduce food wate in a food processing company. The study title is exploring how employees learn about food waste in a food processing company in Gauteng.

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Annexture 10: Interview schedule

INTERVIEW SCHEDULE– EMPLOYEES (NEWCOMERS AND EXPERTS)

Newcomers (Employees working less than 5 years) and Experts (employees working more than 5 years)

Interview date:

Interview venue:

Name of the interviewee:

Name of the interviewer:

1. Job role
    a. What is your gender?

    ……

    b. What is your age?

    ……

    c. What is your job title?

    ……..

    d. Which department do you work in?

    ……

    e. What is your role in the food processing plant?

    ……

    f. How long have you been working in this food processing plant?

    ……
2. Food waste knowledge
    a. What do you know about food waste?

    ……

    b. How do you identify food waste or losses during your work?

    ……

    c. What do you do about the food wasted where you work?

    ……

    d. What happens to the food that is wasted?

    ……

e. What do you think are the issues with wasting food during processing?

……

3. Learning about food waste
   a. Do you learn about food waste?

   ……
   b. If yes, where do you learn about it? (Is it through the media, home, the people you work with, at work, work-based learning, external courses, etc? Note that: Let them answer first before you prompt them with ideas)

   ……
   c. How often are you made aware of or taught about food waste at work?

   ……
   d. Where do you learn about food waste at work? (Probe if this is home, work, elsewhere?)

   ……
   e. What do you learn about food waste?

   ……
   f. Why do you learn about food waste at work? (Probe if this is about profit, efficiency, ethics/environment?)

   ……
4. Learning methods about food waste
   a. How do you learn about food waste or losses at work? Probe if this is reading, lecturers, workshops, on-the-job (get them to explain), posters, work education days, etc

   ……
   b. On these ways you learn, which are most useful or practical? For each option, explain why this is useful or beneficial.

   ……
   c. What are the challenges that you face when learning how to reduce food waste or loss at work?

   ……
   d. With the knowledge that you learn at work, does it influence how you reduce food waste outside the workplace? If yes, why?

   ……

5. Improving the learning about food waste
    a. Do you have any thoughts on how to better the learning about food waste at work? If yes, please name any.

       ……

a. Improving the learning about food waste

   Are there any issues regarding how to learn about food waste that were not covered from these questions that you think might be of use, and would like to share?

   …….

b. What would make you reduce food waste at work?

   ……

6. Any other comments?

Annexture 11: Interview schedule

INTERVIEW SCHEDULE– MANAGEMENT

Interview date:

Interview time:

Interview venue:

Name of interviewee:

Name of interviewer:

1. Job title

a. What is your job title?

…….

b. What is your role regarding the learning about food waste?

……..

2. Food waste knowledge

a. For what reasons do you introduce work-based learning opportunities about food waste during the commercial processing of food?

……..

b. For how long have you been using work-based learning opportunities about food waste as means to teach employees how to reduce food waste when processing food?

……

c. Is the learning on how to reduce food waste continuous or time-bound?

……

d. Do you bring external bodies (trainers) to teach employees how to reduce food waste?

…….

e. Any qualification or experience that you consider when selecting those to provide training regarding food waste reduction?

……

f. What kind of skills-set do you plan to teach the employees so that they minimise food waste during the processing of food?

……

g. Do you provide any formal qualification of recognition of food waste to those who completed the learning?

……..

3. Learning methods about food waste

a. What are the work-based learning opportunities that are used to teach employees how to reduce food waste?

……..…

b. Of all the learning methods used, which method(s) do employees indicate that it becomes simpler and easier for them to better understand how food waste can be reduced?

……..

c. What are the challenges faced when organising and facilitating work-based learning about food waste?

……..

d. How do you identify employees' behavioural changes regarding food waste reductions as they commercially process food?

……..

e. From the feedback from sustainability trainers and experts, what are some of the challenges do they mention to you as challenges when teaching employees how to reduce food?

…….

4. Improving the learning about food waste

a. Are there any issues regarding how employees learn about food waste that were not covered from these questions that you think might be of use, and would like to share?

……..

b. What are the future plans for facilitating the learning about food waste?

…….

5. Any other comments?

Annexture 12: Interview schedule

INTERVIEW SCHEDULE– SUSTAINABILITY TRAINERS

Interview date:

Interview time:

Interview venue:

Name of interviewee:

Name of interviewer:

1. Job title

a. What is your job title?

……..

b. What is your role(s) regarding the learning about food waste for employees?

……..

c. Do you have any formal qualification regarding food /waste or any related issues?

……..

d. Are you part of the company or you work independently and come to the company to teach employees how to reduce food waste when requested?

……..

2. Learning about food waste

a. Do you teach employees in groups or individually?

…….

b. Any qualification(s) level that are offered to employees after completing the learning on how to reduce food waste?

……..

c. What are the challenges that you face when teaching employees how to reduce food waste?

……..

d. How often do you teach employees how to reduce food waste?

……..

3. Learning methods about food waste

a. What are the learning method(s) about food waste that you normally use when teaching employees how to reduce food waste?

……..

b. Of all the learning method(s) about food waste used, which method(s) do you think make it easier for employees to better understand how food waste can be reduced or how you better deliver the learning about food waste?

……..

c. What are the challenges faced when using learning method(s)?

……..

d. How do you identify that an employee behaviour has changed and now can master how to reduce food waste and are becoming experts?

……..

4. Improving learning about food waste

e. Are there any issues regarding how employees learn about food waste that were not covered from these questions that you think might be of use, and would like to share?

…….

5. Any other comments?

……

Annexture 13: Observation schedule

Aspects observed/employee's activities	Pupil 1	Pupil 2	Pupil 3	Pupil 4	Pupil 5	Pupil 6	Pupil 7	Pupil 8	Pupil 9	Pupil 10	Pupil 11	Pupil 12
How do employees handle spilled food during the processing stage?												
How do they handle food that does not look good during and after processing?												
How do they handle food that does not smell good when												

	being processed?												
	How do they avoid labelling confusions to minimise food waste?												
	How do they handle poorly processed food?												
	Where do they dispose of processed food that is no longer edible?												
	How do they communicate during the processing of food to reduce												

	food waste?												
	Do they learn from each other how to reduce food waste during the processing of food?												
	What challenges do they experience when attempting to reduce food waste during food processing ?												
	Are they understanding how to reduce food waste during the processing of food on their own?												