

**Consumers' knowledge of date labelling and the influence thereof on household fresh
produce waste practices in Gauteng**

By

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Department of Consumer Science

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**Verbruikers se kennis van datumetikettering en die invloed daarvan op huishoudelike
varsprodukte-afvalpraktyke in Gauteng.**

Deur

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Oktober 2017

DECLARATION

I, Natashka Rosa Venter, declare that the dissertation, which I hereby submit for the degree of Masters in Consumer Science (General) at the University of Pretoria, is my own work and has not previously been submitted by me for a degree at this university or any other tertiary institution and that all reference materials in the dissertation have been duly acknowledged.

NATASHKA ROSA VENTER

October 2017

DEDICATION

This dissertation is dedicated to my Parents, Husband and Son.

ACKNOWLEDGEMENTS

I would like to use the opportunity to thank those who contributed to this study. Without your guidance, inspiration and support this research would not be possible.

- Above all I would like to thank God, my Creator through our LORD Jesus Christ for being my strength, hope and encouragement in this journey. All the praise is given unto Him.

Psalm 28:7 “The LORD is my strength and my shield; my heart trusted in him, and I am helped: therefore my heart greatly rejoiceth; and with my song will I praise him.”

- To my supervisor, Dr. Nadene Marx-Pienaar, who was the fundamental reason for my selection of this area of research, a deep thank you. Your ability to critically assess ideas and arguments without breaking down the spirit or optimism of the person concerned is truly special. I would like to thank you for your patience and persistence at times and advice in conducting this study to the best of my ability.
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- To all the participants, thank you for your patience and for gladly sacrificing your time to take part in this research.

SUMMARY

Consumers' knowledge of date labelling and the influence thereof on household fresh produce waste practices in Gauteng

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Department: Consumer Science

Degree: Masters in Consumer Science (General)

Keywords: Fresh Produce, Food waste, Consumer knowledge, Date labelling, Sustainability.

Globally, it is estimated that one-third of the food produced for human consumption is lost or wasted, which amounts to a concerning 1.3 billion tons per year (FAO, 2011). More concerning is the fact that much of the wastage is unnecessary because consumers often misinterpret product attributes such as date labels (i.e. sell-by; use-by and expiry-date), which they often rely on as a primary indication of product quality and/or safety. This tendency often leads to premature discarding/wastage of food products such as fresh produce. The problem is further exacerbated as current retail procedures and policies determining the date labelling on food products such as fresh produce are seldom regulated and also contribute towards food losses and wastage in the pre-and post-consumption stages. In order to reduce the current levels of food waste, it is imperative that improvements are made not only at household level, but in all stages of the supply chain, thus from farm to fork.

This study first and foremost aimed to explore consumers' current fresh produce waste practices in order to investigate date labelling as a pertinent reason for unnecessary fresh produce wastage. The study secondly aimed to explore consumers' knowledge of fresh produce date labelling (in terms of subjective and objective knowledge dimensions), i.e. their understanding and interpretation of date labelling, not only in order to describe consumers' current fresh produce wastage practices, but also to propose mitigating strategies.

The Systems Theory was found appropriate and therefore used to guide discussions as it enabled the researcher to understand the sequence, relationship and interdependency of fundamental elements that influence fresh produce wastage.

Data collection was executed in two phases. An electronic questionnaire was implemented to gather data pertaining to Phase 1. Data collection for Phase 2 relied on focus group discussions. The respondents were recruited across Gauteng using a convenience sampling technique.

The overall findings regarding consumers' food wastage revealed that fresh produce is indeed the product category wasted the most, particularly vegetables, with respondents indicating that of all fresh produce purchased per month, an estimate of 41.24% is wasted. In terms of consumers' knowledge of date labelling, the results revealed that consumers might be somewhat overly confident (subjective knowledge). Many consumers eagerly noted that they knew enough about date labelling in order to make wise consumer decisions, but failed to present that knowledge when tested objectively. The results from the focus group discussions supported these findings and emphasised the fact that confusion in terms of Date Labelling Theory, i.e. the difference between the dimensions of date labelling (i.e. sell-by, use-by and best-before dates) is mostly the reason for misinterpretation and subsequent produce wastage. In terms of the main barriers that hinder more sustainable consumption, the results indicated that although poor planning and purchasing ranked as the most worrisome, date labelling still featured amongst the top five reasons for wastage. Possible avenues to mitigate consumers' misinterpretation of date labelling and fresh produce wastage included: 1. Making use of an app that alerts users, 2. Removing sell by dates, and 3. Getting more support from the South African government through education and awareness campaigns.

Whilst several studies have been done on household food waste practices, few have studied consumers' subjective and objective knowledge dimensions on date labelling. To the researchers' knowledge, this is the first paper exploring consumer date labelling knowledge and the impact it has on household fresh produce wastage practices in Gauteng. By assessing the reasons for wastage, greater insight is gained with regard to presenting possible avenues that could mitigate fresh produce wastage.

OPSOMMING

Verbruikers se kennis van datumetikettering en die invloed daarvan op huishoudelike varsprodukte-afvalpraktyke in Gauteng.

Deur

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Departement: Verbruikerswetenskap

Graad: Meesters in Verbruikerswetenskap (Algemeen)

Sleutelwoorde: Varsprodukte, Voedselafval, Verbruikerkennis, Datum etikettering, Volhoubaarheid.

Wêreldwyd word beraam dat een derde van die voedsel wat vir menslike verbruik geproduseer word, verlore gaan of vermors. Dit beloop ongeveer 1,3 miljard ton per jaar (FAO, 2011). Baie van die vermorsing is onnodig omdat verbruikers dikwels produktenmerke soos datumetikette (d.w.s. verkope, gebruiks- en vervaldatum) verkeerd interpreteer, deur dit as 'n primêre aanduiding van kwaliteit van die produk en / of veiligheid te ag. Hierdie neiging lei dikwels tot voortydige wegdoening van voedselprodukte, veral vars produkte. Die probleem word verder vererger aangesien huidige kleinhandelprosedures en beleide wat die datumetikettering op voedselprodukte soos vars produkte bepaal, selde gereguleer word en ook bydra tot voedselverliese en vermorsing in die voor- en na-verbruik stadiums. Om die huidige vlakke van voedselafval te verminder, moet prosesse in die hele waardeketting, van plaas tot vure, verbeter word om in die eerste plek afval te voorkom, en waar dit nie voorkom kan word nie, te verminder.

Hierdie studie het in die eerste plek daarop gemik om verbruikerspraktyke rakende varsprodukte te ondersoek om sodoende die etikettering van datums te ondersoek as 'n relevante rede vir onnodige verswakking van vars produkte. Die studie het tweedens daarop gemik om die verbruikers se kennis van varsprodukte-datumetikettering (in terme van subjektiewe en objektiewe kennisdimensies) te ondersoek, naamlik hul begrip en interpretasie van datumetikettering, nie net om verbruikers se huidige

varsprodukte-afvalpraktyke te beskryf nie, maar ook om versagtende strategieë voor te stel. Die Stelselteorie is toepaslik gevind en is dus gebruik om besprekings te lei aangesien dit die navorser in staat gestel het om die volgorde, verwantskap en interafhanklikheid van fundamentele elemente wat varsprodukte vermorsing beïnvloed, te verstaan.

Data-insameling is in twee fases uitgevoer. 'n Elektroniese vraelys is geïmplementeer om data wat betrekking het op Fase 1 te versamel. Data-insameling vir Fase 2 het gefokus op fokusgroepbesprekings. Die respondente is in Gauteng gewerf met behulp van 'n geriefsteekproefnemingstegniek.

Die algehele bevindings rakende voedselverspilling deur verbruikers is dat varsprodukte, veral groente, die meeste vermors word. Dit word beraam dat soveel as 41,24% van alle varsprodukt aankoop per maand deur huishoudings vermors word. Wat die verbruikers se kennis van datumetikettering betref, het die resultate geblyk dat verbruikers ietwat te veel selfvertroue kan hê (subjektiewe kennis). Baie verbruikers het gretig opgemerk dat hulle genoeg geweet het van datumetikettering om wyse verbruikersbesluite te neem, maar nie die kennis kon aanbied wanneer hulle objektief getoets is nie. Die resultate van die fokusgroepbesprekings ondersteun hierdie bevindings en beklemtoon die feit dat verwarring in terme van Datum-etiketteringsteorie, dit wil sê die verskil tussen die dimensies van datumetikettering (dws verkope, gebruik-en beste datums) meestal die rede vir verkeerde interpretasie en daaropvolgende produseer vermorsing. In terme van die vernaamste struikelblokke wat meer volhoubare verbruik belemmer, het die resultate aangedui dat hoewel swak beplanning en aankope as die grootste bekommernis beskou word, is die etikettering van die datum nog steeds onder die top vyf redes vir vermorsing. Moontlike weë om die verkeerde interpretasie van datumetikettering en gevolglik varsprodukt vermorsing aan te spreek, sluit in: 1. Gebruik van 'n program wat gebruikers waarsku, 2. Verwyder verkope volgens datums, en 3. Om meer ondersteuning van die Suid-Afrikaanse regering te verkry deur middel van onderwys- en bewusmakingsveldtogte.

Alhoewel verskeie studies gedoen is oor huishoudelike afvalpraktyke, het min mense die subjektiewe en objektiewe kennisdimensies van verbruikers op datumetikettering bestudeer. Hierdie is, volgens die kennis van die outeur, die eerste studie wat verbruikers kennis oor datumetikettering en die verband met varsprodukt vermorsing op huishouding vlak in Gauteng ondersoek. Deur die redes vir vermorsing te evalueer, word meer insig verkry met betrekking tot die aanbieding van moontlike weë wat verspilling van vars produkte kan versag.

EDITING CERTIFICATE

Exclamation Translations

To whom it may concern

The dissertation titled, "Consumers' knowledge of date labelling and the influence thereof on household fresh produce waste practices in Gauteng" has been edited and proofread as of 10 October 2017.

As a language practitioner, I have a Basic degree in Languages, an Honours degree in French and a Master's degree in Assessment and Quality Assurance. I have been translating, editing, proofreading and technically formatting documents for the past seven years.

Please take note that Exclamation Translations takes no responsibility for any content changes made to the document after the issuing of this certificate. Furthermore, Exclamation Translations takes no responsibility for the reversal or rejection of the changes made to this document.

Kind regards



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ACRONYMS

| | |
|--------------------|--|
| BCFN | Barilla Centre of Food and Nutrition |
| CSIR | Council for Scientific and Industrial Research |
| DEA or DEAT | Department of Environmental Affairs and Tourism of South Africa |
| DEFRA | Department of Environmental, Food and Rural Affairs |
| FAO | Food and Agricultural Organisation of the United Nations |
| FMI | Food Marketing Institute |
| FSIS | Food Safety and Inspection Service |
| GST | General Systems Theory |
| IMechE | The institution of Mechanical Engineering |
| LVHW | Love Food Hate Waste |
| NIST | National Institute of Standards and Technology |
| SDG | Sustainable Development Goals |
| USDA | United States Department of Agriculture Food Safety and Inspection Service |
| WRAP | Waste & Resources Action Programme |
| WRI | World Resources Institute |
| WWF | World Wide Fund for nature |

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CHAPTER 1 THE STUDY IN PERSPECTIVE

This chapter provides the background of the research introduces the research problem, the justification, research design and methodology and highlights important constructs that are relevant throughout the study.

1.1 INTRODUCTION

Throughout the ages, the emergence, development and persistence of human civilizations have been shaped by the supply and availability of food (Charles, Godfray, Crute, Haddad, Lawrence, Muir, Nisbett, Pretty, Robinson, Toulmin & Whiteley, 2010). For the last few decades, food has been reviewed as being relatively cheap, more readily available and accessible probably than any other time in history (Charles *et.al.*, 2010). This could partly explain why many consumers today tend to easily discard food products that no longer meet their needs or quality preferences/expectations and seem ignorant regarding their personal contribution towards food wastage in South Africa (Marx-Pienaar & Erasmus, 2014). It is furthermore noted that food wastage not only receives little prominence at governmental level, but is often down-played not only by retail, but also by many consumer households who emphasise attributes such as quality, appearance, health and safety (Ferreira, 2014; Brits, 2015). Poor knowledge regarding the evaluation of respective intrinsic and extrinsic attributes such as quality or safety often allows consumers to rely on cues such as date labels (i.e. “use-by”, “sell-by” or “best-before ” dates) when purchasing or consuming food (Gunders, 2012, United States Department of Agriculture Food Safety and Inspection Service, 2013; Marx-Pienaar & Erasmus, 2014). This is somewhat concerning as the date labels on food are often not regulated and do not necessarily indicate food safety or the quality of the product (Gunders, 2012).

Date labelling (such as sell by, best if used by, or best-before) refers to a suggestive system that allows retailers to review the shelf life of the product with respect to optimum quality for stock rotation purposes (FMI and GMA, 2007; NIST, 2013; Newsome, Balestrini, Baum, Corby, Fisher, Goodburn & Yiannas, 2014). Commonly found on perishable and non-perishable products, date labelling is usually determined by the manufacturer and only acts as a safety margin and *not* a fixed value, which means that it can vary from time to time (Gunders, 2012; Industries, 2012; Prinsloo, van der Merwe, Bosman & Erasmus, 2012). It is furthermore noted that globally, most consumers often misinterpret date labels, thus resulting in premature and unnecessary food wastage (Newsome *et al.*, 2014). Research on date labelling done in the United Kingdom by the Waste and Resource Action Programme (WRAP,

2011) shows that 45-49% of consumers misunderstand the meaning of date labelling, resulting in an enormous amount of prematurely discarded food. In fact, it is estimated that up to 20% of household food waste is linked to date labelling confusion (WRAP, 2011). A survey done by the United Kingdom's Food Standard Agency found that food waste is rated among the top three food issues of concern to the public, ranking above food safety (Gunders, 2012).

In **South Africa**, 10.2 million tonnes of food are wasted per year compared to the 1.3 billion tonnes of food lost and wasted globally (Bond, Meacham, Bhunnoo & Benton, 2013; Nahman, de Lange & Oelofse, 2012; Nahman & de Lange, 2013; Notten, Bole-Rental & Rambaran, 2014). In **Sub-Saharan Africa**, food waste amounts to 210kg per person per annum, compared to the 280-300 kg per person per annum in **Europe** and **North America** (Nahman & de Lange, 2013; FAO, 2011). In the **European Union (EU)**, 42% of total food waste is generated by households and 39% by the production and processing sector (EU, 2011). In South Africa, estimates indicate that waste from the household waste stream contributes approximately 4.14% to the overall food waste, with the majority being generated during the pre-consumption stages (Oelofse & Nahman, 2013). The estimated cost of post-consumer food waste in South Africa is approximately R21.7 billion per annum. Food wasted at household level in South Africa is estimated at 1.4 million tonnes per year, with fresh produce (fruit and vegetables) contributing to the largest amount of waste with estimates set at 44% (Nahman & de Lange, 2013). Compared to the figures released in the United Kingdom (UK), which revealed that UK households waste approximately 39% of the fresh produce purchased (FAO, 2011a; Nahman & de Lange, 2013) South African figures could be viewed as somewhat alarming.

Unfortunately, many consumers today still select, procure and consume fresh produce in a manner that could be deemed unsustainable. To date, most consumers tend to prefer fresh produce that presents a certain combination of intrinsic and extrinsic attributes. Intrinsic attributes include a product's quality, safety and sensory evaluation, whereas the extrinsic attributes include price, place of purchase/storage, packaging, date labelling and regulatory requirements (Industries, 2012). Consumers are often under the impression that 'good value for money', or for that matter, a product worthy of consumption, should present attributes such as good quality, be blemish free, packaging that is intact and date labelling that is not expired (Brits, 2015). Marx-Pienaar & Erasmus (2014) identifies that most consumers rely on extrinsic attributes such as date labels when purchasing and evaluating fresh produce prior to consumption because they do not necessarily have the proper knowledge or access to the product to evaluate the product's intrinsic attributes (i.e. quality and safety). Gunders (2012) explains that consumers' trust in extrinsic attributes such as date labels is unfortunate

because although consumers might think they know what is implied by date labelling, they often misinterpret the labelling, which leads to unnecessary or premature wastage of fresh produce.

Consumers' knowledge has an important role during purchasing, consumption and the ultimate wastage of food products such as fresh produce (Park, Mothersbaugh & Feick, 1994). According to Klerck and Sweeney (2007), two distinct types of knowledge are recognised: **subjective knowledge**, which refers to a person's perception of the amount of information about a product class stored in his or her memory (Brucks, 1985; Flynn & Goldsmith, 1999; Park *et al.*, 1994), i.e. what consumers think a use-by date is; and **objective knowledge**, which pertains to the actual amount of accurate information stored in a person's memory (Brucks, 1985; Park *et al.*, 1994), i.e. the definition for a use-by date (only a right or wrong answer). Objective knowledge is thus viewed as a possible tool to improve consumers' ability to use and interpret date labels (Graham-Rowe, Jessop & Sparks, 2014), which could aid in mitigating unnecessary food wastage. Due to the significant contribution that fresh produce makes towards food wastage, it is believed that addressing consumers' knowledge, which influences procurement and consumption of this commodity, could result in the mitigation of future wastage.

Unfortunately, very little research regarding consumers' knowledge (objective and subjective) of date labelling and the impact thereof on fresh produce wastage has been done within the South African context. This is concerning as the prevention of misinterpretation of date labelling could mitigate unnecessary wastage of fresh produce. The issue is exacerbated by the fact that whilst we are wasting at an alarming rate, 13.4% of individuals and 11.4% of households today still do not have access to sufficient food, and thus we can no longer believe that we have a functioning global food system (Charles *et al.*, 2010; StatsSA, 2016). It is also said that the global population is to reach 9.5 billion by 2075 and therefore it is vital that mankind ensures that it has the food resources available to satisfy future generations (IMechE, 2013). Research on waste management practices is therefore urgently needed to reduce waste throughout the supply chain (i.e. farm to fork) should we long for a future society that has access to a sustainable food system (IMechE, 2013).

It was thus the purpose of this study to identify and determine date labelling as a reason for food wastage in South Africa by identifying date labelling; in particular, consumers' misinterpretation of date labels as a pertinent reason for fresh produce wastage. This research therefore aimed to explore and determine consumers' knowledge (subjective and objective) regarding date labelling. This was further carried out to propose different avenues

that could be implemented to empower consumers to assess date labelling in a more conscientious manner that would limit the wastage of fresh produce.

This research project furthermore contributes to the research focus of the Department of Consumer Science at the University of Pretoria and addresses the need in food waste reduction as identified by the CSIR.

1.2 RESEARCH PROBLEM

Globally, it is estimated that one-third of the food produced for human consumption is lost or wasted, which amounts to a concerning 1.3 billion tons per year (FAO, 2011). More concerning is the fact that much of the wastage is mostly unnecessary because consumers often misinterpret product attributes such as date labels (i.e. sell-by; use-by and expiry-date), which is often used by consumers as a primary indication of product quality and or safety (EPRS, 2015; NRDC, 2013). This often leads to premature discarding and therefore unnecessary wastage of food products such as fresh produce. The problem is further exacerbated as current retail procedures and policies determining the date labelling on food products such as fresh produce are seldom regulated and therefore lead to unnecessary food loss and wastage in the pre-and post-consumption stages. In order to reduce current levels of food waste, it is imperative that improvements are made, not only at household level, but in all stages of the supply chain, thus from farm to fork.

This study first and foremost aimed to explore consumers' current fresh produce waste practices in order to investigate date labelling as a pertinent reason for unnecessary fresh produce wastage. The study also aimed to explore consumers' knowledge of fresh produce date labelling (in terms of subjective and objective knowledge dimensions), i.e. their understanding and interpretation of date labelling in order to not only describe consumers current fresh produce wastage practices, but also propose mitigating strategies.

1.3 JUSTIFICATION OF THE STUDY

It is said that food waste generated at household level is becoming a major area of concern as it threatens not only the sustainability of future natural resources, but also the economic and social well-being of many countries (Parfitt, Barthel & Macnaughton, 2010). South Africa, with its emerging economy, aspiring middle class, and even more importantly, the high ratio of citizens that can be classified as food insecure, can therefore no longer avoid the urgent call to address this issue. Bond *et al.* (2013), suggest that food wastage needs to be addressed at every stage of the supply chain, but recommend in particular that consumers'

knowledge, perceptions, evaluation and acceptance of food receive special attention. Previous studies confirm that consumers often waste food prematurely and unnecessary because they often wrongfully evaluate product attributes such as fresh produce quality due to their misinterpretation of date labelling.

To date, very little has been done globally to investigate the on-going problem of food waste. Recent studies emphasise the notable lack of information regarding waste management in households (Nahman *et al.*, 2012; Marx-Pienaar & Erasmus, 2014; Brits, 2015) and furthermore also state the need to investigate the role that consumers' knowledge plays in terms of food wastage practices. In terms of the South African context, no recent research that focuses on consumers' subjective and objective knowledge of date labelling and the impact thereof on consumers' current fresh produce wastage is available. It is therefore believed that this research presents the following contributions.

Academic contributions: It is believed that the findings from this study could be useful to understand knowledge dimensions better, i.e. subjective and objective knowledge, , which could assist in building theory regarding the application of these dimensions within the context of consumer science, and in particular, food wastage practices. By investigating the issue at hand, the research may provide insight into consumers' interpretation of date labelling and therefore the findings could offer possible avenues that could be harnessed to mitigate premature and unnecessary fresh produce wastage. Thus, this information could positively contribute towards putting mitigation strategies into practise that could combat fresh produce wastage.

In terms of the Department of Consumer Science, the research will contribute towards meeting the outputs planned for the research project *Food wastage, sustainability and the triple bottom line – A case study of urban households in Gauteng, South Africa*, which is also part of the research focus of Consumer behaviour and Sustainability. This study will also support the on-going relationship between the Department of Consumer Science, the Department of Food Science, and the CSIR.

Consumer and retail related contributions: It is believed that the findings from this research could be used in assisting not only curbing unnecessary fresh produce wastage, but also in encouraging both consumers and retailers to take note of the importance of their respective contributions to issues related to food wastage such as food security and climate change. According to the South African Governmental Report on Environmental Sustainability Indicators and Climate change response (DEA, 2010), research has to be

encouraged to focus on the factors that determine the public's resilience regarding the commitment to more sustainable practices.

Recent research in the United Kingdom has delivered strong evidence that amending retail practices, for example, extending the shelf life of products together with educating consumers regarding the interpretation of date labels, could contribute to reducing household food waste (Quested, Marsh, Stunell & Parry, 2013). Research on date labelling in the United Kingdom furthermore suggests that standardising food date labelling and clarifying its meaning for the public reduces household food losses by as much as 20%. The findings from this research could assist in clarifying what consumers actually know and what they think they know and therefore could contribute to consumer education on date labelling, which could add value to current regulatory guidelines on fresh produce labelling practices.

Government related contributions: Reducing food waste is acknowledged as a key means of addressing both food and water security concerns (Quested *et al.*, 2013). This study can also help improve or change practices and policies or recommendations, helping to reduce food waste in South Africa. In terms of the international policy set by the United Nations Sustainable Development Goals (UN SDG), this study aims to address SDG 12.

1.4 RESEARCH AIM AND OBJECTIVES

This study first and foremost aimed to explore and describe consumers' current fresh produce waste practices in order to investigate date labelling as a pertinent reason for unnecessary fresh produce wastage. The study also aims to explore and determine consumers' knowledge of fresh produce date labelling (in terms of subjective and objective knowledge dimensions) i.e. their understanding and interpretation of date labelling not only in order to explain consumers current fresh produce wastage practices but also to propose mitigating strategies.

Objective 1: To explore consumers' current fresh wastage practices in order to identify date labelling as a pertinent reason for unnecessary fresh produce wastage.

Objective 1.1: To explore and describe consumers' current self-reported fresh produce wastage practices.

Objective 1.2: To investigate the likelihood of consumers using date labelling as a pertinent reason for discarding fresh produce.

Objective 2: To explore consumers' general knowledge of date labelling (in terms of Subjective and Objective knowledge dimensions) in order to describe current misinterpretations of date labelling that contribute to unnecessary fresh produce waste practices.

Objective 2.1: To explore consumers' subjective knowledge of date labelling.

Objective 2.2: To explore consumers' objective knowledge of date labelling.

Objective 3: To identify and propose possible avenues that could be implemented to mitigate consumers' misinterpretation of date labels and thus curb unnecessary fresh produce wastage.

1.5 STUDY AREA

The study was conducted in the geographic area of the Gauteng province in South Africa. Currently Gauteng has an estimated population size of 13.2 Million residents, which is estimated to be 24% of the total population of South Africa (STATSSA, 2016). Gauteng currently houses the capital city of Pretoria and offers a respondent pool that presents different population groups.



Figure 1.1: Map of Gauteng

The reason for choosing the Gauteng province was that this area is the most rapidly expanding and prosperous province in South Africa. As a result of economic expansion and growth, this province is deemed the most affluent in South Africa and it can therefore be

assumed that it would offer a respondent pool comprising people who are in the position to not only purchase a variation of fresh produce, but who also possess the financial means to adapt their buying behaviour in accordance with more sustainable guidelines.

1.6 RESEARCH DESIGN AND METHODOLOGY

The research included both exploratory and descriptive investigations. The exploratory investigation entailed exploring consumers' current consumption and wastage of fresh produce. This was done to establish if date labelling could be considered as a pertinent reason for fresh produce wastage. The descriptive investigation that followed aimed to gain insight into consumers' knowledge of date labelling in order to describe consumers' current wastage practices.

An exploratory sequential mixed methods design was used to gather data to achieve the aim and objectives set out for this study. To collect the data needed, the research relied on two main phases.

Phase 1 comprised a structured questionnaire (quantitative investigation). The data collection for Phase 1 commenced by collecting primary responses regarding consumers' fresh produce waste practices and reasons for waste. Data pertaining to the objectives set for Phase 1 were extracted from a comprehensive structured questionnaire that focused on critical issues regarding consumers' understanding and current wastage practices. The structured questionnaire formed part of a more extensive investigation titled "*Food wastage, sustainability and the triple bottom line – A case study of urban households in Gauteng, South Africa*". In order to meet the objective set for this study, only relevant sections in the primary questionnaire were identified and used for data collection. The relevant sections are discussed in detail in Chapter 4.

Phase 2 included a qualitative investigation that comprised two focus group discussions. Although the focus group meetings were held to gather detailed information about consumers' awareness/knowledge of date labelling, it was decided to include two very simple quantitative tests (measuring consumers subjective and objective knowledge respectively) at the start of each focus group. The tests were purposively included to support the qualitative data that was gathered during the actual focus groups.

Following a multi-phase approach allowed for a more holistic review and presentation of the problem at hand.

The study was **cross sectional** in nature, which meant that the data was collected from a specific population at a particular point in time (June 2015 to July 2016).

1.6.1 The unit of analysis

The unit of analysis for the study consisted of adult male and female consumers residing in Gauteng, 21 years and older, who were responsible for purchasing or were the primary decision makers with respect to food purchasing, preparation and waste management. No restrictions were placed in terms of population group, income or education level.

The only prerequisite for participation was that the respondents had to be involved or responsible for food purchasing, preparation and waste management in their homes.

The procedure of collecting data was managed by the primary researcher, who took responsibility for recruiting suitable respondents.

1.6.2 Sampling technique and size

Convenience sampling, a non-probability sampling technique, was used to gather data for Phase 1. Convenience sampling, although deemed less rigorous, is a statistical method of drawing representative data by selecting respondents based on ease and accessibility. The advantage of this type of sampling is the accessibility and speed with which data can be collected, as well as its benefit for studies with financial limitations. The problem, however, is that a convenient sample is not necessarily representative of the population that it was drawn from (Areni, 2003; Salkind, 2008). With this being said, it was not the intention of this study to distinguish between the population groups residing in Gauteng in terms of their waste behaviour or knowledge of date labelling. Because the population in South Africa is very cosmopolitan and complex, a correlation of this kind would have required a much larger sample, which was financially and logistically not viable. Possible participants for the Phase 2 focus groups were identified from the sample pool of respondents who partook in the consumer questionnaire (Phase 1). During the questionnaire, respondents were asked to indicate (by providing their contact details) whether or not they would be willing to participate in the focus group. These respondents were later contacted. Ultimately, a total of 12 respondents representing the demographic profile of the consumer questionnaire agreed and were recruited to partake in the focus groups, which were held on 23 May 2016 and 8 July 2016 at the Amka Products boardroom, based in Pretoria.

1.7 VALIDITY AND RELIABILITY

The aim of the research is to provide data that are valid and reliable to ensure confidence in the findings; to determine the success and publish-ability of the research; to ensure that the findings emerge in terms of the context and from the respondents, rather than from the researcher's pre-conceived ideas and intentions; and whether the participants shared information that was true (Lincoln & Guba, 1985:290; De Vos, Strydom, Fouche & Delport, 2011:172). Salkind (2006:113) views validity to be "truthfulness, accuracy, authenticity, genuineness and soundness [...]" and stresses the fact that these terms describe what validity is all about: that the test or instrument you are using actually measures what you need to have measured." A research study is only valid when the conclusions are meaningful and defensible and can be drawn from the data that is obtained. There are four traditional forms of validity looked at in this research, which are further described in Chapter 4, i.e. content validity, face validity, criterion validity and construct validity.

Reliability is viewed as: "dependable, consistent, stable, trustworthy, predictable and faithful" Salkind (2006: 106). The reliability of a study thus means that a test measures the same thing more than once, and that the outcomes are the same, giving consistent results. The reliability of the study was ensured by certain pre-conditions, as described in Chapter 4.

1.8 ETHICS: A MATTER TO CONSIDER

Like most academic institutions and professional associations, the University of Pretoria has set a formal code of conduct regarding social research, which, according to Creswell (2014:95), is required. All proposed research projects are officially evaluated and approved before any research endeavour can begin. The Ethics Committee of the Faculty of Natural and Agricultural Sciences scrutinises the research protocol, including detailed references to the measuring instrument.

All potential participants were informed about the purpose of the study and asked to participate voluntarily (Rubin & Babbie, 2005:71). Willing respondents' identities were protected through the anonymous completion of the questionnaires, as De Vos *et al.* (2011:119) suggest. All participants were guaranteed that the information gained from the study would be kept confidential. No person, whether participant or researcher, were exposed to harm or inconvenience or were at risk in any way during this study.

The researcher was also conscious of guarding against plagiarism and ensured that all ideas or thoughts from other researchers were well referenced. Research fraud could result from falsifying or abusing data collection through using outside statisticians. This was a non-issue in this case as the appropriate statistical programs were used to be certain that the findings

would be true and valid. A third party reviewed the interpretation of the data so that the reporting was done objectively.

1.9 THEORETIC PERSPECTIVE

The General Systems Theory (GST) was found to be appropriate and therefore used to guide discussions as it enabled the researcher's understanding of the sequence, relationship and interdependency of fundamental elements that influence fresh produce wastage.

The system as a process reflects a sense of order and distinguishes three main phases: inputs, transformation and outputs, and also an essential feedback loop.

There are three primary constructs that were explored in the research, namely: (1) Household fresh produce wastage, (2) Date labelling interpretation in terms of consumers' subjective and objective knowledge, and (3) Mitigating strategies.

Applied in the context of this study, **input** presents consumers' household wastage practice, which is currently viewed as an area of concern. Consumers often do not understand the dates on labels and interpret them incorrectly, thus discarding fresh produce unnecessarily. During the **transformation phase**, date labels are interpreted by consumers, who rely on their personal knowledge dimensions, i.e. subjective and objective knowledge. It is therefore important to identify possible avenues that could be implemented to mitigate consumers' misinterpretation of date labels (**Output**) and thus curb unnecessary fresh produce wastage. This will form part of a consumer's internal framework of reference that could influence future interpretation, consumption and waste practices (**Feedback**).

1.10 PRESENTATION AND STRUCTURE OF THE RESEARCH

This dissertation is presented in six chapters, as summarised below.

Chapter 1: THE STUDY IN PERSPECTIVE

This chapter provides the background of the research, introduces the research problem, the justification thereof, the research design and methodology, and highlights important constructs that are relevant throughout the study.

Chapter 2: LITERATURE REVIEW

This chapter presents the literature review. It sets the background for the research investigation and provides an overview of the relevant constructs present in this study. The

main themes that are discussed include food wastage, date labelling, and consumers' knowledge in terms of subjective and objective dimensions.

Chapter 3: THEORETIC PERSPECTIVE, CONCEPTUAL FRAMEWORK AND RESEARCH OBJECTIVES

This chapter delves into the relevant theoretic perspectives that were used to frame the objectives, the research design, and to support the methodology used in this study. The chapter also elaborates on the conceptual framework of the study.

Chapter 4: RESEARCH DESIGN AND METHODOLOGY

This chapter provides an exposition of the research design. It concludes with details pertaining to the research methodology, which comprised two phases. The study population and research setting, as well as the measuring instruments are outlined and described.

Chapter 5: RESULTS AND DISCUSSION

This chapter presents the findings derived from both Phase 1, the quantitative data collection phase, and Phase 2, which included the focus groups and subjective and objective knowledge tests. All of the results are presented and discussed in terms of the objectives set for the study.

Chapter 6: CONCLUSION OF THE STUDY

This chapter presents the conclusion of the research in terms of the objectives set for the study. The shortcomings of the study are discussed and recommendations are made for future research.

CHAPTER 2 LITERATURE REVIEW

This chapter presents the literature review. It sets the background for the research investigation and provides an overview of the relevant constructs presented in this study. The main themes that are discussed include food wastage, date labelling, and consumers' knowledge in terms of subjective and objective dimensions.

2.1 FOOD WASTE: A GLOBAL CONCERN

Currently, it is estimated that the world's annual production of food equates to four billion metric tonnes (IMechE, 2013). Unfortunately, of this four billion, one-third of all food produced for human consumption is lost or wasted (Gustavsson, Cederburg, Sonesson, van Otterdijk & Meybeck, 2011; Eggerdorfer, Kraemer, Cordaro, Fanzo, Gibney, Kennedy, Labrique & Steffen, 2016). Projections indicate that by the year 2100, feeding the world's growing population will become a challenge (Eggerdorfer *et al.*, 2016). Addressing the issue of food waste should therefore be viewed as a matter of urgency as it not only will have an impact on the natural environment, but could also aid in addressing issues such as hunger (Edmond, 2016).

The Food and Agricultural Organisation (FAO, 2011) estimates indicate that the per capita food waste at consumer level in developed countries such as the UK is estimated at 95-115 kg/year, while in developing countries, it is 6-11 kg/year. In South Africa, it is estimated that about 10.2 million tonnes of food are lost or wasted in some form across the supply chain – from an estimated 31million tonnes of food produced (Nahman & de Lange, 2013). This problem is not only further exacerbated by the energy and natural resources wasted during the production of this food, but also by the fact that this waste is seldom acknowledged (Notten *et al.*, 2014). Recent studies on food waste both locally and globally, according to Notten *et al.* (2014), have revealed major data gaps of knowledge about global food waste, especially with regard to quantifying food losses at various stages in the supply chain. Although these facts and figures mentioned are viewed as concerning, and warrant urgent attention, addressing the problem is not a simple matter.

At an EU level, 'waste' is generically defined as "any substance or object which the holder discards or intends to discard" (European Parliament, 2010; DEFRA, 2012:9). The application of such a generic definition to food is, however, not necessarily possible, thus adding to the problem discussed. To date, there is no commonly agreed upon and accepted definition of food waste, thus limiting the investigation of this issue (World Resources Institute, 2016).

The term food waste has been applied in multiple research articles and can be summarised as food losses and food wastage at the production, post-harvest and processing stages of the food value chain (Notten, *et al.*, 2014). The World Resources Institute has developed a common global approach known as the Food Loss and Waste Protocol to define and measure food waste (World Resources Institute, 2016).

Previous research has differentiated between the meaning of food losses and food waste. **Food losses** refers to food originally intended for human consumption but that never reaches the consumer. It thus occurs in the stages preceding retail and the consumer – at the production, post-harvest and processing stages of the food supply chain (Parfitt *et al.*, 2010) and is also identified as pre-consumer food waste (Nahman & de Lange, 2013). Whereas **food waste** refers to food losses at the retail and consumer stages and refers to food suitable for human consumption that is discarded due to spoilage or expiry. This is identified as post-consumer food waste (FAO, 2013a; Nahman *et al.*, 2013; Eggerdorfer *et al.*, 2016). Recent research done by Eggerdorfer *et al.* (2016:174) in the UK also defined **food wastage** as “any food lost by wear or waste. Thus, the wastage is here used to cover both food loss and waste.” Research done by De Lange and Nahman (2015) also distinguishes between edible and inedible food waste cost. The cost of edible food waste in South Africa is estimated at R61.5 billion per annum, whereas inedible food waste contributes to R6.9 billion per annum (De Lange & Nahman, 2015). It is therefore seen that edible food waste contributes to a higher cost value than inedible food waste. Eggerdorfer *et al.* (2016) also indicate that food waste is a major problem in industrialised nations, where throwing away food is often cheaper than using or re-using, and consumers can afford to waste food due to a better financial status. For this reason, food waste, especially unnecessary waste at household level, is identified as a global concern.

For the purpose of this study, it was decided on to define food waste as any edible food product that is intended for human consumption but has instead been discarded, lost, degraded or consumed by pets, and does not include the inedible or undesirable portions of foodstuffs such as bones, skins, seeds and peels. Previous research done by Franke, Hartikainen, Mogensen and Svanes (2016) also recognises food waste as not including the inedible or undesirable portions of foodstuffs.

2.1.1 Household food waste and the impact thereof on SA's natural, social and economic environment

As mentioned earlier, global food waste estimates are calculated to be approximately one third (1.3 billion tonnes) of all food produced and destined for human consumption

(Gustavsson *et al.*, 2011; IMechE, 2013). Of significance is the fact that the literature indicates that food waste differs in terms of a country's level of development. According to international trends, food waste in developing countries is mostly generated by manufacturers and industry, for example, in the pre-consumer stages, as compared to developed countries where food waste is mostly generated in the consumer/household waste stream (FAO, 2011; Eggerdorfer *et al.*, 2016). Recent figures from a study done in the EU indicated that the waste generated by the production and processing sector is estimated at 39% compared to the waste generated by households, which equates to 42%. In contrast, Sub-Saharan African households seem to be responsible for approximately 4.14% of overall food waste, with the majority of food waste thus being generated during the pre-consumption stages (Oelofse & Nahman, 2013). This composition can be debated as very little has been done in terms of waste generated at household level in Sub-Saharan Africa (Brits, 2015; Marx-Pienaar & Erasmus, 2014).

To date, there is research available, however, it mostly presents findings regarding food waste from manufacturers' or industry perspectives. Although this research is much needed, it is somewhat concerning that very few studies present the case of food wastage in terms of household wastage (Brits, 2015; Ramukhwatho, du Plessis & Oelofse, 2014). Examples of household food waste studies globally do, however, include the UK funded programme 'Love Food Hate Waste' delivered by WRAP, which was launched in 2006. The campaign approached household food waste through multiple research techniques, covering the compositional analysis of waste, questionnaires, surveys, focus groups, household diary research and ethnographic studies. The findings indicate that 60% of UK households' food waste arises from products 'not used in time' but that the industry in the UK is already doing a lot through innovation to extend the life of food in order to reduce food waste (Williams, Wilkstrom, Otterbring, Lofgren & Gustafsson, 2012). A follow-up study noted that since the implementation of the 'Love food hate waste campaign', the UK has shown a 21% reduction in the amount of food wasted (Quested *et al.*, 2013). Although more recent data suggests that food waste is being addressed and that there are positive indications that the amount per year is decreasing, most studies seldom differentiate between the industrial and household waste streams. This should be viewed as a matter of urgency as the findings from respective USA and EU studies indicate that waste from households might be increasing as the average American family discards approximately 25% of the food they buy, and as a result of little intervention and a growing population, this issue is forecasted to become more serious (Gunders, 2012; STOA, 2013).

When reviewing food wastage in South Africa, no accurate figures on food waste or the generation thereof could be found (IMechE, 2013; Notten *et al.*, 2014). However, a study done by the CSIR (2013) estimated that 31% of the annual food production in South Africa is wasted (Oelofse & Nahman, 2013); a figure much higher than the national organic waste baseline estimated for South Africa (Notten *et al.*, 2014). In terms of food wastage amongst South African households, the findings from various studies only add to the current dilemma of an information deficit as Tsekoa, Hui, Jayiya, Johannessen & Hara, (2007) estimate the wastage to be at 85kg per person per year; while Nahman *et al.* (2012) estimate it to be at approximately 1.4 million tonnes per year, which translates to 28kg per person per year, but revised figures in 2013 indicate that the average South African tends to waste closer to a 105 kg per person per year (Nahman *et al.*, 2013). The Barilla Centre of Food and Nutrition (BCFN, 2012) specifies the amount of food wasted in more developed countries (in households per capita per year) as follows: 110kg in UK, 108kg in Italy, 99kg in France, 82kg in Germany, 72kg in Sweden and a staggering 280 kg in the USA (Nahman & de Lange, 2013; Quested *et al.*, 2013; Jörisen, Priefer, & Bräutigam, 2015). In comparing these figures with those of South Africa, the conclusion is that South Africans can no longer avoid the issue at hand. To date, the issue of household food waste has received little attention, which is somewhat concerning as this could aid in alleviating hunger, and because wastage is detrimental to our natural, economic and social environment.

Food loss and waste have many economic and environmental impacts (Lipinski *et al.*, 2013). In Economic terms, food loss and waste represent a wasted investment and at present, South Africa's economy is highly dependent on natural resources for food and energy production, and inputs for manufacturing (Marx-Pienaar & Erasmus, 2014; Lipinski *et al.*, 2013). The problem is further exacerbated by the fact that the future growth of the South African economy is likely to be highly dependent on natural resources, which we should conserve (DEAT, 1999). Environmentally, food loss and waste inflicts a host of negative impacts on our country's natural environment. Food waste disposed of at landfills not only pollutes our ground water, but generates methane, which contributes significantly to our GHG emission and therefore to climate change (Marx-Pienaar, 2014; Oelofse & Nahman, 2013; Lipinski *et al.*, 2013). When food is wasted, all the embedded energy and water used to produce it are also wasted (Notten, *et al.*, 2014). Food waste therefore does not represent a problem only because of its disposal, but also because of the energy, water and other resources consumed throughout its value chain, which can also be considered wasted as a result (Notten, *et al.*, 2014). If food waste is reduced, natural resources such as water, land and energy could rather be used to increase food production, or affect the food system in other ways (Tielens & Candel, 2014). More efficient production might also help to stabilise price

increases and thereby improve the affordability component of food, which in turn could address the food insecurity issues prevalent in South Africa (Mason-Jones *et al.*, 2013).

Currently 13.4% of South Africa's population go to bed hungry each day (StatsSA, 2016). Addressing food waste globally, but especially in South Africa, has thus become a matter of urgency. Although it might be a daunting task, it is believed that reducing household food waste would not only have a substantially positive economic effect, but could also be beneficial in terms of our society as a whole. On a global level, the World Resources Institute (WRI) states that reducing food loss and waste is part of creating a sustainable future (Tielens & Candel, 2014). Furthermore, it is also noted that if confronted with the issue of food wastage, most societies do not like wasting food (Wrap, 2008), which is somewhat encouraging.

2.1.2 Fresh produce wastage

Historically fresh produce (which in this study refers to fresh fruit and vegetables) has been highly recommended in dietary guidelines for health promoting properties around the world because of the vitamin and mineral content found in them (Slavin & Loyd, 2012). An increased awareness of nutritional benefits and a combination of large scale production and more efficient distribution have resulted in a recent purchasing surge of this specific commodity (Marx-Pienaar & Erasmus, 2014). Brits (2015) states that marketing media is mostly responsible for encouraging consumers to purchase fresh produce in abundance as consumers often believe that it indicates a commitment towards healthy living. Unfortunately, consumer's zealous/enthusiastic purchasing of fresh produce does not always result in timely consumption and this often ends in unnecessary wastage (Marx-Pienaar & Erasmus, 2014).

The latest available figures (illustrated in Figure 2.1) indicate that in terms of edible food waste generated along the South African value chain, the relative contribution of fresh produce accounts for 44%, whereas other commodities such as cereals are estimated at 26% (Nahman & de Lange, 2013). Compared to figures from a global analysis of food loss and waste, fresh produce contributes 35% at the consumption stage and it is estimated that annually, consumers waste more than a fifth of the fresh produce that they purchase. Recognised as the commodity wasted the most in households, addressing the consumption and ultimate wastage of fresh fruit and vegetables needs to become a priority (WRAP, 2013; Parfitt *et al.*, 2010; FAO, 2011; Lipinski *et al.*, 2013).

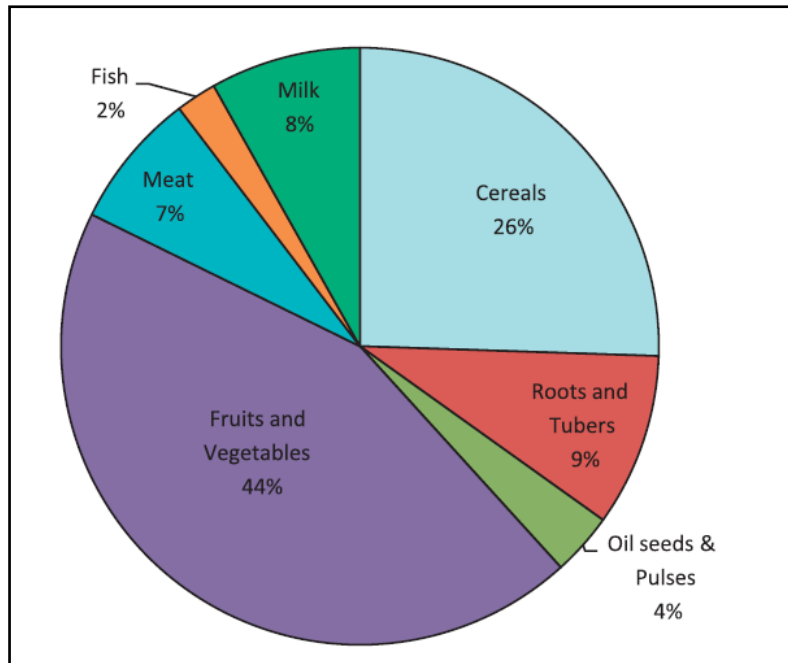


Figure 2.1: Relative contribution of fresh produce waste compared to other food commodities in South Africa (Nahman & de Lange, 2013:2495)

In terms of particular products, Wrap (2009a) found that amongst UK households, 50% of lettuce/leafy salads purchased were wasted and that approximately 177,400 tonnes of potatoes and 178,800 tonnes of apples purchased by UK households were thrown away whole and untouched. A survey in Ghana found that 13.6% of the onions and 30.4% of the tomatoes produced were wasted, whilst 60% of mangoes were wasted annually (FAO, 2009; WRAP, 2008).

To address this unnecessary wastage of fresh produce, Bond (*et al.*, 2013) suggests reverting to methods of preservation such as canning, freezing, pickling or drying, which were very popular in earlier years but have somewhat lost their appeal amongst households, likely due to consumers lacking the knowledge and skill to preserve the products. It is also due to the fact that discarding fresh produce is not necessarily considered as detrimental (Bond *et al.*, 2013; Swanepoel, 2016). Marx-Pienaar and Erasmus (2014) note that consumers very seldom consider the impact of fresh produce waste and therefore are prone to waste unnecessarily.

2.1.3 Curbing unnecessary fresh produce wastage: identifying and addressing the reasons

Although the need to curb general consumer wastage is proclaimed by South African government, industry and academia, only a limited amount of work attempts to assess the specific mitigation of fresh produce waste, for example, looking at the relationship between consumers' knowledge and date labelling as a reason contributing to fresh produce household waste practices (Basson, O'Carroll & Bronkhorst, 2016; Porpino, 2016). The Organisation of Economic Co-operation and Development in the US has identified reducing food waste as an avenue to increase the availability of food (Bagherzadeh, Inamura & Jeong, 2014), therefore also elevating food insecurity (Tielens & Candel, 2014). According to Tielens and Candel (2014:9), food security is a state where "all people, at all times, have physical and economical access to sufficient, safe and nutritious food that meet their dietary needs and food preferences for an active and healthy life." It is suggested that reducing and reusing waste may have a positive impact on long-term food security through the efficient use of resources and its environmental impact (Tielens & Candel, 2014; Lipinski *et al.*, 2013). It is therefore important to identify, understand and address the reasons for fresh produce waste practices in households.

According to Lipinski *et al.* (2013), food waste at household level occurs for a number of reasons, which range from health concerns such as unappetising leftovers to confusion over date labelling. A recent survey carried out among 560 households in a major metropolitan area in South Africa indicated that most households wasted fresh produce due to various intrinsic product attributes such as attractive product appearance, health and nutritional beliefs, as well as various extrinsic product attributes such as purchasing too much due to cheap pricing, poor planning, and attractive displays (Marx-Pienaar & Erasmus, 2014). Most concerning in their study was that 44.05% of the respondents admitted to wasting fresh produce because the produce had reached its expiration date.

In the UK, a quantitative survey was conducted by Wrap (2007) where respondents were asked to describe the situations in which they would most likely throw away food. The most frequently mentioned scenarios were that food had passed its best-before or use by date, sometimes even if the food still appeared edible; six out of 10 respondents suggested that this was a key reason for throwing away uneaten food. With this being said, all of the studies referred to above highly emphasise the fact that fresh produce wastage is a result of various intrinsic and extrinsic variables and an urgent need exists to explore the impact of consumers' interpretation of date labels in particular, and how it relates to fresh produce wastage. It is

therefore critical to understand consumers' awareness, perceptions, opinions and attitudes that could partly explain the level of household food wastage (Buzby, Farah-Wells & Hyman, 2014; Qested *et al.*, 2012; Aschemann-Witzel *et al.*, 2015).

As such, there is a need for education/information on consumers' interpretation of date labels, which may be an effective way to minimise the amount of food items disposed of unnecessarily (Wrap, 2007).

Another comparative survey that was done amongst consumers in Italy (Ispra) and Germany (Karlsruhe) also indicated that date labels are amongst the top reasons for household wastage (Jörissen *et al.*, 2015).

Influence of various demographic variables and household waste

The amount of fresh produce wastage in households seems to be influenced by various demographic variables including household size, age and gender (Yaqub, 2016).

Recent survey amongst household in Grahams town, Eastern Cape results showed that household size and levels of waste produced had a significant difference and studies observe that households with children generate a higher amount of food waste compared to households without children (Nkoana, *et al.*, 2016, Parizeau *et al.*, 2015). The possible explanation suggested to this difference, is for instance related to bulk purchases and purchasing more than what is necessary by individuals in the household (Yaqub, 2016).

In different parts of the world it has also been observed that younger age groups waste more than older people, specially concerning those at the age of 65 or older (Qested *et al.*, 2013; Secondi *et al.*, 2015). As older people might have a different management of food in homes due to different life experience than the rest of the population, this might be a possible explanation (Qested *et al.*, 2013). Similar findings in a pilot study amongst 56 individuals in Oslo, at "Universitetsplassen" results present that older respondents estimated lower amount of food wasted in their households compared to younger respondents (Yaqub, 2016).

Furthermore, gender also seems to impact the amount of food wasted, even though further research is needed. In EU Countries women seem to waste less compared to men because they are more concern towards food waste (Secondi *et al.*, 2015).

2.2 DATE LABELLING AND ITS IMPLEMENTATION IN CURRENT FOOD INDUSTRIES

Dates first appeared on food packages approximately 100 years ago (Labuza & Szybist, 2001). As societies became further removed from food production and the source of their

food, their ability to determine product freshness decreased and manufacturers started to apply dates on products to indicate freshness (Newsome *et al.*, 2014). Today, it is still used as a communicative tool that presents product quality and food safety, as determined by the manufacturer or retailer.

Although date labelling is often viewed and could be discussed as part of a product's packaging, in this study, it will receive special attention as it is not only of more relevance in terms of the objectives formulated for this study, but because date labelling has also been identified as one of the main reasons for fresh produce wastage amongst many households (Aschemann-witzel *et al.*, 2015; Newsome *et al.*, 2014).

When reviewing food products such as fresh produce it is evident that due to their high water content, these products tend to be highly perishable¹ and as a result need to be managed and merchandised accordingly, for example, prominent usage of date labelling in this product category.

2.2.1 Date labelling defined

Date labelling can be defined in terms of two main dimensions: firstly, **open date labelling** (such as sell by, best if used by, or best-before) refers to a suggestive system that allows retailers to review the shelf life of the product with respect to optimum quality for stock rotation purposes. Thus, open date labelling is intended to be understood by individuals in the supply chain who are responsible for the product, and thus for ensuring high product quality for consumers (FMI and GMA, 2007; NIST, 2013; Newsome *et al.*, 2014).

Secondly, **closed (code) date labelling**, as described by Newsome *et al.* (2014:746), refers to the information that manufacturers place on products, usually those having a long shelf life, to manage product stock at retail level from a quality-driven perspective, and for recall and product tracing purposes. Closed code dates may be comprised of letters, numbers, or symbols; may refer to the place of manufacture, time of manufacture, or product identity; and are generally not easily understood by consumers (USDA/FSIS 2011). Closed date labelling aids in product identification and is useful for product recalls or tracing, particularly trace-backs and trace-forwards, because the production dates can be identified or obtained by the manufacturer (Newsome *et al.*, 2014:746).

¹ *Perishable foods are described as those foods with a shelf life of days to several weeks, and in which spoilage is generally microbial growth. This includes fruit & vegetables, milk, meat, fish and poultry. Semi-perishable foods have a longer shelf life than perishable foods and include food categories such as eggs, some cheeses, juices, moist pasta products, packaged meals, and hummus (Aschemann-witzel et al., 2015; Newsome et al., 2014). "Relatedly, the willingness to pay for a perishable product decreases throughout its shelf life" (Aschemann-witzel et al., 2015:6462).*

Examples of open codes include: labelling on packaging, such as “use-by”, “sell-by”, and “best-before” dates. These are intended to provide the consumer with information regarding the freshness and safety of foods (Lipinski *et al.*, 2013). In the US, there are 14 items identified as open date labelling (Council, 2013), namely:

- (a) “For full fresh flavour use by”
- (b) “For best quality purchase and use by date shown”
- (c) “Use/freeze by”
- (d) “Prepare or freeze by”
- (e) “For wholesome great taste, serve before date stamped below”
- (f) “Best when purchase by date”
- (g) “Best if sold by”
- (h) “Best used by”
- (i) “Product expiration”
- (j) “Expiration date”
- (k) “Best by”
- (l) “Best before”
- (m) “Best when purchase by”
- (n) “Use before”
- (o) “Use-by”
- (p) “Full freshness until date shown when stored unopened at 40 or below”
- (q) “Prepare by”
- (r) “Fresh until”
- (s) “Use or freeze by”
- (t) “Sell or use by”
- (u) “Freshness through”

As presented in the above list, the intention of open codes is to indicate the period in which food remains safe and suitable for consumption, meaning that the food has not deteriorated in quality or spoiled in any way that the consumer would find unacceptable (Industries, 2012; Lipinski *et al.*, 2013).

Date labelling terminology and application vary widely and, according to Newsome *et al.* (2014), this might be the reason for consumers’ misunderstanding and ultimate misinterpretation. Notten *et al.* (2014) state that the problem is further exacerbated by the fact that the application of these date labels is seldom done in a consistent manner within a specific company and furthermore differ between companies, which confuses consumers even more. It is therefore suggested that there may be room to reduce unnecessary

household food waste by clarifying the meaning of these dates and changing the way in which they are used, displayed and interpreted.

In this literature study, only three main terms used for date labelling will be reviewed, namely, use by date, best-before date, and sell by date as these are mostly used by South African retailers.

2.2.1.1 Best before date

The South Africa Department of Basic Education (2014) has described the following terminology for “**Best-Before**” or “**Best-Before End**”: it refers to the date that signifies the end of the period under any stated storage conditions during which the product will remain fully marketable and will retain any specific qualities for which tacit or express claims have been made. However, beyond this date, the food may still be perfectly satisfactory. The Best Before date is therefore the specific date that the manufacturer has deemed fit to guarantee the quality of that product and by which the product should still be safe to consume in terms of ideal quality (Note, 2014; Newsome *et al*, 2014).

While still safe to eat and often perfectly fine after the Best-Before date, quality can deteriorate. In Figure 2.2 below there are examples of Best-Before date labelling used in retail. It is not illegal to sell a product past its Best Before date, but it may not be of ideal quality any more (Gunders, 2012).



Figure 2.2: Best-before date

The Food Standard Code of New Zealand indicates that the **best-before date** signifies the end of the period during which the intact package of food, stored in accordance with any stated storage conditions, will remain fully marketable and will retain any specific qualities for which express or implies claims have been made.

2.2.1.2 Use-by date

Alternatively, New Zealand indicates that **use-by date** refers to the date that signifies the end of the estimated period if stored in accordance with any stated storage conditions, after which the intact package of food should not be consumed because of health or safety reasons (Industries, 2012). South African law (Regulation R146) makes it compulsory to put date stamps on all perishable pre-packed food items and these must carry a use by date (Department of Basic Education, 2014). This is the date for which the manufacturer of the food product guarantees its safety in terms of consumption (Newsome *et al*, 2014). It is illegal to sell products after the Use-by date as the product is not considered safe anymore and should be discarded after the use-by date (Note, 2014). In Figure 2.3, an example is presented displaying a use-by date.

"Use-by" (Best Consumed Before, Recommended Last Consumption Date) refers to the date that signifies the end of the estimated period under the stated storage conditions, after

which the product probably will not have the quality attributes normally expected by the consumers and after which date the food should not be regarded as marketable (South Africa Department of Basic Education, 2014).



Figure 2.3: Use-by date

2.2.1.3 Sell-by date

"Sell-by date" or **"display until date"** refers to the last date of "offer for sale to the consumer" after which there remains a reasonable storage period at home (South Africa Department of Basic Education, 2014). The sell-by date is only used for the convenience of the retailer and consumer. It shows the retailer when the supplier wants the item removed from shelves and it gives the consumer time to use the product after it's been bought. There is a period of time beyond this date that the product is usable before the quality is less than the manufacturer's standards for consumer acceptance (Newsome *et al.*, 2014). According to the South African Foodstuffs Act (Regulation R146), it is not illegal to sell a product after the sell-by date had expired. Products between the sell-by date and the use-by date will usually be placed on sale, discounted, removed from shelves, discarded or donated (Bond *et al.*, 2013; Notten *et al.*, 2014). In Figure 2.4 below, an example is displayed of the usage of sell-by dates on fresh produce.



Figure 2.4: sell-by date

2.2.2 Regulations regarding date labelling in South Africa

The application and perception of date labelling of foodstuffs and the legislation governing food labelling is complicated by multiple regulatory perspectives and challenges around the world (Newsome *et al.*, 2014). South African law (Regulation R146) makes it compulsory to put date labels on food with the exception of a few items such as unprocessed honey, unpacked meat, vinegar, sweets, and fresh produce. Basically, all perishable pre-packaged food items must carry a use-by date (Council, 2013). The date labelling regulation for South Africa (R146/2010) was published in the Government Gazette, 1 March 2010. With the new South African food labelling and advertising regulations (R146) having been passed in March 2010, all labels and advertising of food products in South Africa must be compliant.

On the 29 May 2014 an amendment to the South African Food Labelling Regulations, R429/2014 was published and is enforceable for national and international food manufacturers whose products are sold in the country (South Africa). This amendment aims to facilitate food purchasing decisions by preventing misleading messages (Prinsloo *et al.*, 2012; Department of Basic Education, 2014).

The regulations indicated by the South Africa Department of Basic Education (R429 OF 29 MAY 2014: 49) for date marking is mentioned in five points as follows:

1. No person shall import, manufacture, sell, distribute or donate a food unless a date marking is clearly indicated on the label or container of such food.

2. The date shall be preceded by appropriate words "Best Before" and/or "Use By", and/or "Sell By", depending on the nature of the product; Provided that abbreviations shall not be permitted, except "BB" for "Best Before", and the preceding words shall be written out in full.
3. The date marking may not be removed or altered by any person.
4. In cases where several items are included in an outer wrapper or sleeve, which during normal usage by the consumer will be discarded, the date shall appear on the packaging that will be retained by the consumer until consumption.
5. The date shall be indicated in the order, "Day-Month-Year", when numbers only are used. In the case where an order other than "Day-Month-Year" is used, the month shall be indicated in letters, either written out in full or abbreviated (e.g. "Feb" or "February"), and the year shall be written out in full (e.g. 2014).

A current problem South Africa is facing regarding date labelling regulation is consumers' perception of food safety that is related to their trust of the food industry and confidence in the government's protective regulations (Fotopoulos & Krystallis, 2003). Unfortunately, in the past, some South African manufacturers have confused consumers with misleading information on labels, and inconsistency in the regulations could lead to even greater consumer confusion and could also stand in the way of voluntary industry adoption of a more standardised dating system (Council, 2013 & Prinsloo *et al.*, 2012). To prevent this, labelling regulations that specify minimum requirements in terms of expiry dates should be according to governmental prescriptions (Hoffman, Czinkota, Dickson, Dunne, Griffin, Hutt, Krishnan, Lusch, Ronkainen, Rosenbloom, Sheth, Shimp, Siguaw, Simpson, Speh & Ur-Bany, 2005; Prinsloo *et al.*, 2012).

The **regulatory framework of different countries** such as Australia, New Zealand, Canada, European Union, the UK, the US and other countries has been summarised by Newsome *et al.* (2014:747), and can be reviewed in Addendum A.

2.2.2.1 The process of determining date labelling

As presented in the above literature review, it is evident that consumers are not the intended audience where date labelling is concerned. It is therefore understandable that consumers seldom have any idea of how to interpret/apply date labels. Although some regulation exists regarding date labelling, very little if any international standardisation protocol or policy is currently available in which the process of date labelling is explained or outlined.

However, to explain the process, the following section presents the current method of calculation regarding date labels such as the sell-by or use-by labels as implemented by most South African (SA) retailers. According to Anon (2016), this process is an adapted version of the policies applied in New Zealand (NZ) but varies between product type, manufacturer and geography (Council, 2013; Anon, 2016; Industries, 2012). The following figure presents the date marking user guide as applied in NZ.

To help determine when date labelling is needed on food products, the decision tree in Figure 2.5 can be used as a guideline (Industries, 2012).

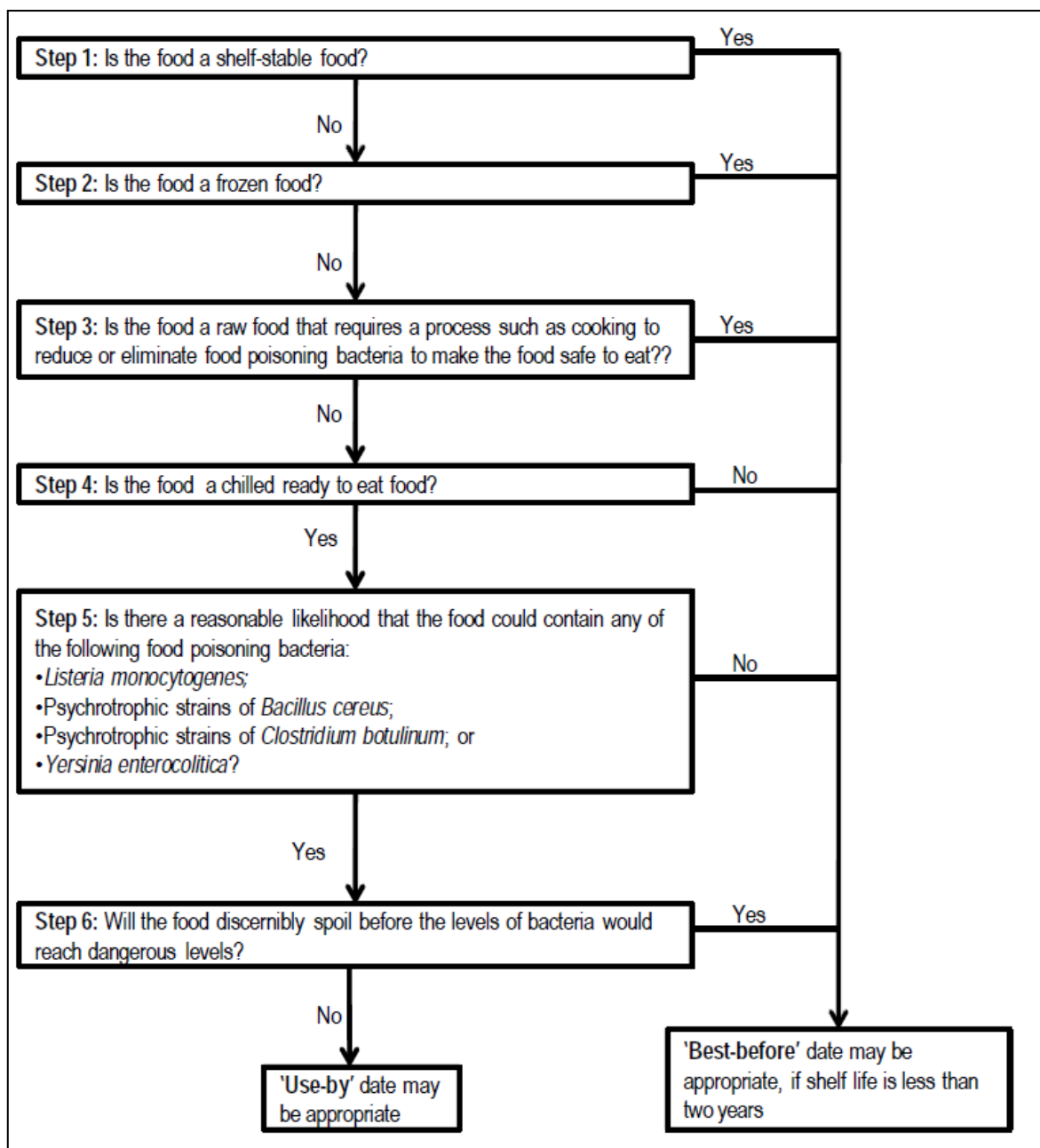


Figure 2.5: Date marking user guide decision tree (Industries, 2012)

Figure 2.5 shows that the process commences by firstly establishing if the product is shelf stable². Once this is decided, a range of follow-up decisions need to be taken in order to conclude whether the product needs a use-by or best-before date. When determining the actual date, the rule of thumb states that this should acknowledge that the product will only stay of good quality for a reasonable amount of time and should thereafter include a reasonable safety margin. “A safety margin is needed because the shelf life is only an approximate and not a fixed value and will vary from time to time” (Industries, 2012:26).

Due to the significant percentage of food wastage globally as a possible result of unregulated date labelling, countries such as the UK and the USA have recently started to suggest making labelling (which is primarily a stock rotation) less visible to consumers as it is often misinterpreted, which leads to unnecessary food wastage (Council, 2013 & DEFRA, 2011).

The USDA (United States Department of Agriculture Food Safety and Inspection Service, 2013) suggests that because product dates are not a guide to be used by consumers for a certain product's usage, consumers should alternatively rather include the following when purchasing and consuming food products. The product can be purchased before the date expires, perishable food should be refrigerated promptly, frozen products that are kept frozen are continuously safe to eat, following handling recommendations for products and storing products accordingly are recommended. A recent study by Harvard Law School and the Natural Resources Defence Council provides a legal analysis of food date label laws across the US, which illustrates pervasive confusion among industry and consumers, ultimately leading to significant amounts of food going to waste (United States Department of Agriculture Food Safety and Inspection Service, 2013). This once again highlights the need to investigate the correlation between date labelling and food waste in order to formulate and implement much needed mitigating protocols and policies.

2.3 CONSUMERS' UNDERSTANDING AND INTERPRETATION OF DATE LABELLING

It is said that compared to 20 years ago, consumers today are very attentive and curious in terms of labelling information when selecting, purchasing and ultimately discarding food products (Brits, 2015). The problem, however, is that although they are eager to review the available information, consumers often do not have the proper baseline knowledge to interpret and apply the information appropriately. The literature further suggests that even

² Another method used to determine dates on labels is using empirical shelf life testing. However, at present, the use of shelf life testing is almost entirely optional (Council, 2013). A product's "shelf-life" can be determined by testing and monitoring the product over its actual shelf-life, which can take several years for shelf-stable products (Council, 2013). A shelf life is described by Note (2014:2) as "...the period of time over which a food maintains its safety and/or quality under reasonably foreseeable conditions of distribution, storage and use (EC, 2005 & EU, 2011)".

consumers who are better educated may still struggle and, in this context, waste as some information such as date labelling is not necessarily intended for their usage (Lipinski et al., 2013). It is reported that the dates on food can actually confuse consumers regarding food safety, storage and ultimate disposal (Lipinski et al., 2013). The intention of increasing consumers' knowledge through date labelling has therefore become an incoherent signalling device resulting in unnecessary wastage from consumers (Coucil, 2013). In the US and around the world, date labelling misinterpretation and confusion are making matters worse where an obscene amount of food is wasted and never gets eaten (Coucil, 2013; Gunders, 2012; Frasz, 2013).

A recent consumer study regarding consumer perception and behaviour relating to date labelling of foods has concluded that there is a serious deficit in terms of understanding consumers' interpretation of date labelling terminology and the contribution thereof to food waste (Newsome *et al.*, 2014). A study done in the US further identified that the misinterpretation of date labels on foods is a key factor leading to food waste. As consumers buy more packed fresh produce, they rely on assurances from retailers that the food they purchase is fresh and have little knowledge concerning the freshness and shelf life of their purchase (Council, 2013).

Research on date labelling in the UK by the Waste and Resource Action Programme (WRAP) shows that 45 – 49% of consumers misunderstand the meaning of date labelling, resulting in an enormous amount of prematurely discarded food (Gunders, 2012). This research can also be substantiated by another survey that was done by Lyndhurst (2011), who explains that consumers are highly confused regarding the meaning of date labels. The participants in that study were given an open box in which to respond to the question, "What do the date labels on food packaging tell you?" The overall findings indicated that consumers seldom differentiated between the use-by and sell-by dates because they assumed it was all the same and as a result, would often discard the food product prematurely. These assumptions, according to Marx-Pienaar & Erasmus (2014), are often the underlying problem contributing to waste, for example, many consumers often assume and therefore think they know what the date label implies, however, this is often far removed from the actual meaning or intention thereof.

Sonneberg *et al.* (2014) furthermore suggest that many consumers might also be under the impression that their knowledge is adequate, which often prevents them from sourcing additional information, which substantiates the old saying, 'ignorance is bliss'.

2.3.1 Consumers' knowledge

Consumers' knowledge has an important role regarding information searching and information processing as it affects the entire consumer decision-making process, from attribute selection to perceived decision outcomes (Park, Motherbaugh & Feick, 1994; Scribner & Weun; 2000). It is therefore noted that consumers must have a sufficient level of knowledge that is based on reliable information in order for information to have a favourable impact on their fresh produce waste practices (Verbeke, 2008; Pieniak, Joris & Verbeke, 2010).

According to Scribner and Weun (2000), consumers' knowledge is a complex, multi-dimensional construct that is characterised by the structure and content of information stored in their memory. Klerck and Sweeney (2007) also acknowledge that knowledge is not a one-dimensional construct, but is actually a complex multi-faceted phenomenon that this study particularly explored in terms of two pertinent dimensions, namely, objective knowledge and subjective knowledge. In short, these dimensions can be explained as follows: **subjective knowledge** refers to a person's perception of the amount of information about a product class stored in his or her memory (Brucks, 1985; Flynn & Goldsmith, 1999; Park *et al.*, 1994). **Objective knowledge** pertains to the actual amount of accurate information stored in his or her memory (Brucks, 1985; Park *et al.*, 1994).

2.3.1.1 Subjective knowledge

In this research, the definition of subjective knowledge is as used by Scribner and Weun (2000), who recognise subjective knowledge as an individual's perception of how much she/he knows about a product category, including brands, attributes, evaluations, decision heuristics and usage situations. Subjective knowledge has been found to be an important part of the knowledge construct because it influences decision makers' perception of their ability to process information and which information they search for in order to process (Mooram, Diehl, Brinberg & Kidwell, 2004).

Aertsens *et al.* (2011:2) summarise the literature of subjective knowledge and comment on the research of House *et al.* (2004) and Ellen (1994), indicating that subjective knowledge is not only positively related to an individual's confidence in their knowledge, but also with stronger attitudes towards a product or behaviour than objective knowledge. For example, most consumers often discard food prematurely because they think they know what the date label means.

Furthermore, subjective knowledge measures require a respondent to specify how much she/he knows about a product category, such as date labelling (Scribner & Weun, 2000).

Subjective knowledge has been reported through empirical testing to be more important to the definition of knowledge because it influences the consumer's perception of their ability to process information and is also identified as measured by subjects' self-reports of their knowledge of a product category or domain (Brucks, 1985; Raju & Reilly, 1980; Rao & Monroe, 1988; Moorman *et al*, 2004). Previous research results indicate that compared to highly educated consumers, low literature/educated consumers tend to rely more heavily on subjective knowledge to guide their decision (King & Balasubramanian, 1994).

2.3.1.2 Objective knowledge

Objective knowledge is the actual content and organisation of knowledge held in the memory, which can include terminology, product attributes, attribute evaluation, brand facts, purchasing, and decision procedures (Brucks, 1986; Mueller, Francis & Lockshin, 2008). Objective knowledge facilitates deliberation and the use of newly acquired information and positively affects the number of attributes considered by an information searching consumer (Ruddell, 1979; Selnes & Gronhaug, 1986; Park & Lessig, 1981; Brucks 1985).

In terms of fresh produce wastage, a consumer who relies on objective knowledge will therefore understand that date labelling is not necessarily indicative of perishability and might interpret it accordingly, which would lead to reduced food waste. In terms of measuring and quantifying consumers' knowledge, it is critical to develop questions that measure objective knowledge in terms of what consumers could reasonably be expected to know (Veale & Quester, 1994). However, establishing a baseline could assist in addressing areas of concern, which is needed to mitigate the misinterpretation of date labelling.

2.4 SUMMARY

Confusion over food date labelling has been mentioned as a major contributing factor at both the industry and consumer level and accounts for a substantial part of household food waste in the UK (Consultation, 2014). Previous research findings support the connection between the misinterpretation of date labelling and food waste (Council, 2013; Lipinski *et al.*, 2013). This study therefore intended to explore consumers' understanding/knowledge in terms of what they think they know (subjective knowledge) and what they actually know (objective knowledge) in order to address their misinterpretation and ultimate wastage of fresh produce.

This chapter aimed to provide a brief overview of the current issue regarding food waste globally and in South Africa. In this review, it was identified that fresh produce contributes to the largest food category of household waste and it is therefore important to investigate this

matter in more detail. One of the main reasons identified in the literature review indicating why consumers waste is because consumers misunderstand the meaning of date labelling and the related terms such as “sell-by, “use-by” or “best if used by” dates on fresh produce. The chapter further investigated date labelling terminology, regulatory requirements and the influence that date labelling has on food waste.

The literature on consumers’ knowledge and understanding of date labelling was reviewed to support the main objectives of this research.

A variety of research has been done globally, but limited research is available in the South African context, it is therefore seen as a research focus area of importance to investigate consumers’ knowledge of date labelling and the impact that it has on household fresh produce waste practices in Gauteng.

The following chapter presents a brief review of the theoretical framework and the application thereof to consumer knowledge of date labelling.

CHAPTER 3 THEORETICAL PERSPECTIVE, CONCEPTUAL FRAMEWORK AND RESEARCH OBJECTIVES

This chapter explains and justifies the theoretical perspective that was used to structure the objectives, research design and to support the methodology used in this study. The chapter also elaborates on the conceptual framework of the study.

3.1 INTRODUCTION

It is said that research cannot be conducted in a theoretical vacuum: it needs to be done within a suitable and relevant theoretical perspective to provide a logical frame of reference for the study (Henning, 2004:12). For this particular study, the Systems Theory was chosen as it enabled a study of the components, sequence, relationship and independency of the fundamental elements of Gauteng households' fresh produce wastage. The successful applications of the System Theory are discussed in various academic publications (Sapaty, 2017).

This chapter will first and foremost introduce the reader to the basic assumptions and key elements or concepts relevant to the Systems Theory. The chapter will conclude by presenting the conceptual framework and research objectives formulated for this study.

3.2 THE SYSTEMS THEORY

The Systems Theory was first developed in the 1930s by a German biological scientist, Ludwig von Bertalanffy (Heil, 2010). The Systems Theory is commonly used in many fields of science and although it was first published in 1946, teachings already started in 1937. In short, von Bertalanffy noted that systems are open interactive units that continuously evolve (attain new properties) as a result of not only the relationship between their different parts or sub-systems, but also the ongoing interaction with their surrounding environments. Rather than reducing an entity (e.g. the food supply chain) to the properties of its stakeholders or elements (e.g. farmers, retailers, consumers), Systems Theory focuses on the arrangement of and relations between the various elements that connect them as a whole (holism).

Heylighten and Joslyn (2002:1) explain that the Systems Theory can be defined as "a trans disciplinary study of abstract organization of phenomena independent of their substance, type, spatial or temporal scale of existence in terms of the principles that are common to all complex entities and models that can be used to describe them." Against this background, a

system is therefore any set of distinct parts that interact to form a complex whole, and is intended to "absorb" inputs, transform them in some way and produce outputs, which are aimed at accomplishing a unitary goal (Seadon, 2010; Spears & Gregoire, 2003). The following assumptions characterise a typical system (Skyttner, 1996, Spears & Gregoire, 2003, Watkins, 2011:44-46).

- **Environment** — this is the spatial area in which all systems operate. It is more specifically defined as either internal or external with the difference being in the system's control over it. Compared to the internal environment over which most systems have control, systems very seldom have any control over the external environment.
- **System boundaries** – this refers to the conceptual boundaries that allow for the grouping of logically related subsystems that, when grouped, form "the system".
- **Sub-systems** – systems rarely exist in isolation. Sub-systems are defined as the interrelated parts that make up to contribute towards the functioning of the larger system.
- **The interdependency of parts** – this refers to the fact that, as noted, all systems are a complex entity of relationships between various sub-systems. It furthermore refers to the interrelationship between individual sub-systems and that change in one could result in the change of another (e.g. Consumers household wastage practices are influenced by consumers' knowledge of date labelling, thus change of knowledge could lead to change in waste practices).
- **Hierarchy** – this implies that within each system (which is composed of different sub-systems) a significant hierarchy resides. Although all sub-systems are relevant, they are not of equal importance in terms of achieving the output planned for the system.
- **Dynamic equilibrium** exists when the system components are in a state of change, but at least one variable stays within a specified range, e.g. date labelling of fresh produce in the near future might not change, but as a result of a change in consumers' knowledge of date labelling, their wastage practices might change. This means that the output is still met even though one of the main sub-systems stays unchanged).
- **Unitary goal** refers to the notion that all true systems are designed and aimed at accomplishing some sort of objective or output (e.g. finding ways to mitigate consumers' wastage practices).

- **Equifinality** refers to the ability of a system to achieve the desired state (output) through different ways (i.e. different strategies could be implemented to understand consumer's knowledge and misinterpretation of date labels to ultimately identify possible mitigating strategies).
- **Holism synergy and gestalt** - the whole is the sum of the parts. It is important to note that a system needs to be explained not only in terms of its sub-systems but also in its totality in order to fully grasp how the inputs were transformed into outputs.

3.2.1 Open and closed systems

The concept of an **open system** refers to a **system** that is characterised by permeable boundaries that allow the exchange of matter with its environment, presenting an input-transformation-output model. This implies that an open system is in a dynamic relationship with its environment, which allows for the system to receive inputs that are then transformed in order to present some sort of output.

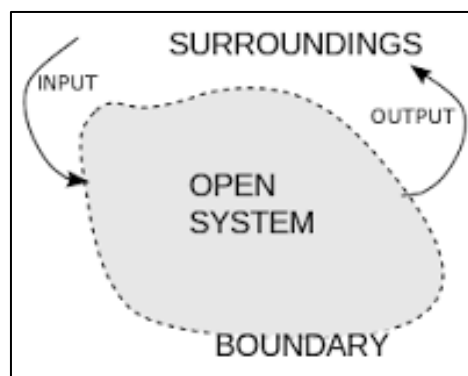


Figure 3.1: The input-transformation-output model (Sapaty, 2017:12)

In comparison, **closed systems** are believed to be self-contained and isolated from their environment (Prinsloo *et al.*, 2011:44). Closed systems are characterised by strict impenetrable boundaries. It is noted that where open systems are highly organised and move towards a specific goal, closed systems tend to move towards destruction (Prinsloo *et al.*, 2011: 46). According to Spears and Gregoire (2004:3), all social and biological systems are considered as open systems as they are in constant interaction with the environment in which they are found.

The scenario where consumers waste fresh produce as a result of their knowledge and interpretation of date labelling is none other than a social system and is therefore classified as an open system.

It is important to note in terms of open systems that they incorporate a definite **feedback loop** (Heil, 2010; Seadon, 2010; Spears & Gregoire, 2003). Seadon (2010) states that systems that incorporate feedback loops are often process-driven, embody adaptability and are able to deliver an output that usually addresses the initial input. These systems can also be practically applied and are usually easy to understand (Heil, 2010).

3.2.2 The Systems Theory applied

The Systems Theory seemed appropriate for this study as it firstly allowed the investigation of Gauteng households' fresh produce wastage (input) in terms of their knowledge, particularly of date labelling (transformation). This secondly not only allowed the identification of areas of concern, but also possible mitigating strategies that could ultimately encourage a more sustainable future (output & feedback).

As discussed, the ability of any open system is dependent on the four integral components of the input – transformation - output and feedback model. The following discussions aim at not only defining these concepts, but also contextualising them in terms of this specific study.

3.2.2.1 Inputs

Input is something put into a system or expended in its operation to achieve a result or output (Spears & Gregoire, 2003:7). According to Finnveden (1998:173), waste management processes, for example, landfilling are often multi-point input processes where different waste materials and products are mixed. In this study Gauteng households' fresh produce wastage and related practices will serve as input.

3.2.2.2 Transformation

Transformation refers to the unified diversion of inputs to outputs (Spears & Gregoire, 2003:7). Put simply, the transformation process is a group of interrelated and interdependent activities that work in a synergistic manner to transform inputs into outputs. The transformation process in terms of this study thus allows the transformation of fresh produce wastage practices through understanding and using consumer's interpretation/knowledge of date labelling.

3.2.2.3 Outputs

Outputs are defined by goals and objectives that result from the transformation phase where the inputs into the system are transformed into the desired outputs (Finnveden, 1998:178). In an ideal situation, outputs are often viewed as information produced by the system that is

intended to be fed back in order to adapt or alter the initial system. In terms of this study, the envisaged output should present possible mitigating strategies that, when 'fed back' into the system, will encourage/mitigate current household wastage practices.

3.2.2.4 Feedback into the system

Feedback is the transmission and return of information and is also seen as a loop diagram that has a balancing effect on the system. Feedback also gives a system its stability and stimulates growth within a system (Watkins, 2000:57; Spears & Gregoire, 2003:4). In terms of this study, feedback could be reviewed as the actual implementation of the proposed mitigating strategies.

3.3 CONCEPTUALISATION

Mouton (1998:114) defines conceptualisation as concept analysis and concept explanation. Conceptualisation is therefore the process in which a researcher indicates what is meant when using particular terms and concepts, and it specifically refines and specifies the concepts used in the study (Babbie & Mouton, 2004:111).

A conceptual framework is needed so that the researcher can organise the theoretical review into a format that clarifies the essence of the research (Marshall & Rossman, 2006:26). Figure 3.2 presents the conceptual framework used in this study, which was formulated in accordance with the relevant literature. The conceptual framework shows the relationship between the primary constructs explored in this research such as the input (household fresh produce wastage), transformation (date labelling, i.e. subjective and objective knowledge dimensions), output (mitigation strategies), and feedback.

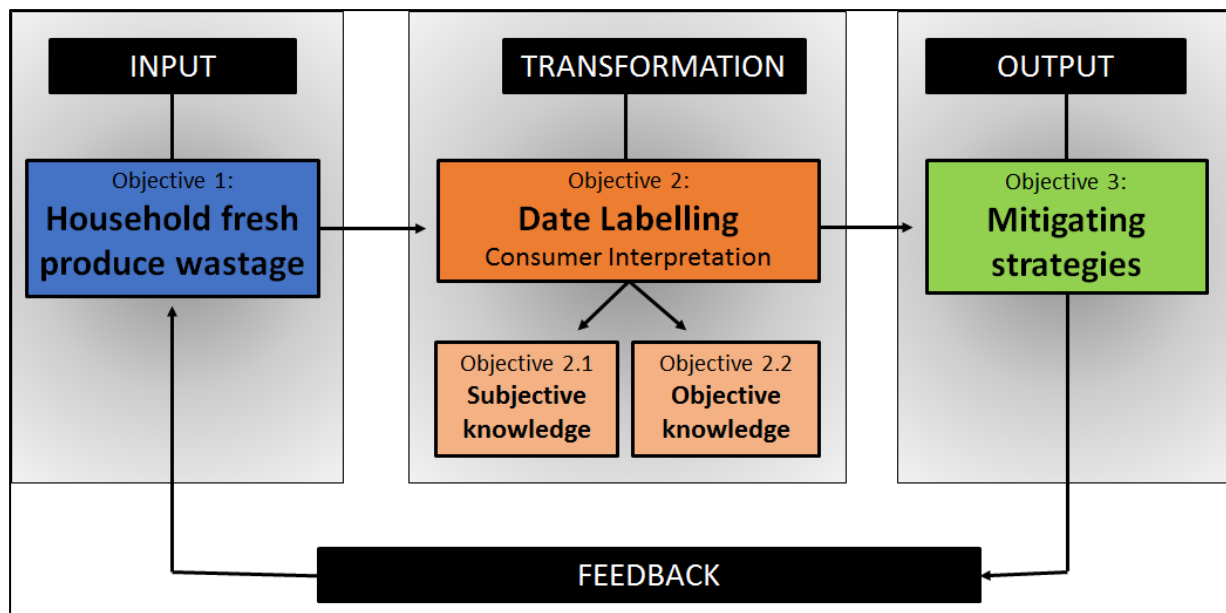


Figure 3.2: Conceptual framework based on the General Systems Theory (GST)

3.4 AN EXPLANATION OF THE CONCEPTUAL FRAMEWORK

The conceptual framework is based on the assumptions founded in the Systems Theory and presents the constructs or sub-systems relevant to this study. There are three primary constructs that will be explored in the research, namely: (1) Household fresh produce wastage, (2) Date labelling interpretation in terms of consumers' subjective and objective knowledge, and (3) Mitigating strategies.

Illustrated in Figure 3.2, household fresh produce wastage is presented as an input not only because it is viewed as a contentious issue, but also because it needs to be addressed. The transformation process aims to contextualise the matter (i.e. fresh produce) in terms of consumers' interpretation and actual knowledge (subjective and objective) of date labelling. As previously discussed, it is noted that consumers often do not understand date labelling and that this misinterpretation (which is often based on a skewed combination of objective and subjective knowledge) unnecessarily maintains consumers' current premature fresh produce wastage practices. Examples that lead to consumer confusion and wastage include multiple dates, inconsistent usage/application in retail, and a lack of education or worse, ignorance (Gunders, 2012; Wrap 2007). When consumers purchase, consume and ultimately waste fresh produce, date labelling acts as an important communication tool to facilitate consumers' final decisions. Consumers' interpretation of date labels is often determined by their knowledge in this respect (Prinsloo *et al.*, 2012). Consumers therefore interpret/transform date labelling within their own frame of reference, which is based on

cognitive structures in their memory resulting from personal experience with fresh produce or from information acquired from friends, family and sales people. When making decisions whether to purchase or discard fresh produce, consumers are thus guided by existing knowledge (even if this knowledge is based on a misconception) of a product. Enright *et al.* (2010) state that consumers often do not interpret the dates on food correctly. Consumers therefore need to be provided with better information on what date labelling means as it is an ideal tool to help facilitate date labelling interpretation and consumers' decisions (Prinsloo *et al.*, 2012; Wrap, 2007).

According to Prinsloo *et al.* (2012), one of the ways of reducing the amount of food wasted in homes is by influencing consumers' knowledge (in particular, objective knowledge) or by making changes to the actual food product that is sold. Identifying possible avenues (outputs) that could be implemented to mitigate consumers' misinterpretation of date labels is thus of the utmost importance (feedback).

It is therefore postulated that the implementation of possible mitigating strategies, for example, providing information about date labels, could form part of a consumer's internal framework of reference that could influence future interpretation, consumption and waste practices.

3.5 AIM OF THE STUDY AND RESEARCH OBJECTIVES

3.5.1 Aim of the research

This study first and foremost aimed to explore and describe consumers' current fresh produce waste practices in order to identify and investigate date labelling as a pertinent reason that maintains the current unnecessary fresh produce wastage. The study also aimed to explore and determine consumers' knowledge of fresh produce date labelling (in terms of subjective and objective knowledge dimensions), i.e. their understanding and interpretation of date labelling not only to explain consumers' current fresh produce wastage practices, but also to propose mitigating strategies.

3.5.2 Research objectives

The following objectives were formulated to direct the study.

Objective 1: To explore consumers' current fresh produce wastage practices in order to identify date labelling as a pertinent reason for unnecessary fresh produce wastage.

Objective 1.1: To explore and describe consumers' current self-reported fresh produce wastage practices.

Objective 1.2: To investigate the likelihood of consumers using date labelling as a pertinent reason for discarding fresh produce.

Objective 2: To explore consumers' general knowledge of date labelling (in terms of subjective and objective knowledge dimensions) in order to describe current misinterpretation of date labelling, which contributes to unnecessary fresh produce waste practices.

Objective 2.1: To explore consumers' subjective knowledge of date labelling.

Objective 2.2: To explore consumers' objective knowledge of date labelling.

Objective 3: To identify and propose possible avenues that could be implemented to mitigate consumers' misinterpretation of date labels and thus curb unnecessary fresh produce wastage.

3.6 SUMMARY

This chapter provided the system-based framework that served as the theoretical perspective. The motivation for using the Systems Theory was outlined and the core assumptions of the theory were explained, which involved concepts such inputs, transformation, output and feedback. The chapter also explicated the conceptual framework, and the objectives of the study were also stated.

Chapter 4 will outline the research design and the methodology of the study. The data analysis is also briefly explained for both the quantitative and qualitative data collection methods.

CHAPTER 4 RESEARCH DESIGN AND METHODOLOGY

This chapter provides an exposition of the research design and methodology, which involved two phases.

4.1 RESEARCH DESIGN

To date, the issue pertaining to consumers' knowledge of date labelling and how it possibly contributes to fresh produce wastage has received limited attention. For this reason, this investigation was empirical in nature. Empirical research involves the use of data that was gathered based on real experiences or observations, and is usually used in research and science to prove a theory or to conclude a study (Moody, 2002). Empirical research is usually necessary when investigating a field of interest that was previously unexplored, as was the case in this study. The research included both exploratory and descriptive investigations. Using exploratory research is inevitable when little information is available about a specific phenomenon (Fouche & De Vos, 2005:106). Exploratory research enables the researcher to gain sufficient insight in order to address the problem at hand; whereas descriptive research aims at observing the situation and then explaining the observations made (De Vos, Strydom, Fouche & Delport, 2011:96; Creswell, 2014:243). In this research, exploratory research was used to gain sufficient insight into consumers' current consumption and wastage of fresh produce. This was done to establish if date labelling could be considered as a pertinent reason for fresh produce wastage. The descriptive investigation that followed aimed to gain insight into consumers' knowledge (i.e. subjective and objective) of date labelling in order to describe their current wastage. Due to the complexity of the topic under investigation, it was decided to implement an explanatory sequential mixed methods data collection approach. According to Creswell (2014:224), the explanatory sequential mixed methods approach is a design in mixed methods that involves both quantitative and qualitative data collection techniques. The overall intent of this design is to use the findings of the qualitative investigation in support of the findings of the quantitative investigation, thus aiming to present a more detailed or holistic view. This approach, however, implied that the research entailed two phases where the quantitative (Phase 1) data was collected and analysed first, followed by the qualitative phase (Phase 2) data.

Figure 4.1 demonstrates the research phases of this study using an explanatory sequential mixed methods design that was adapted from Creswell (2014:220).

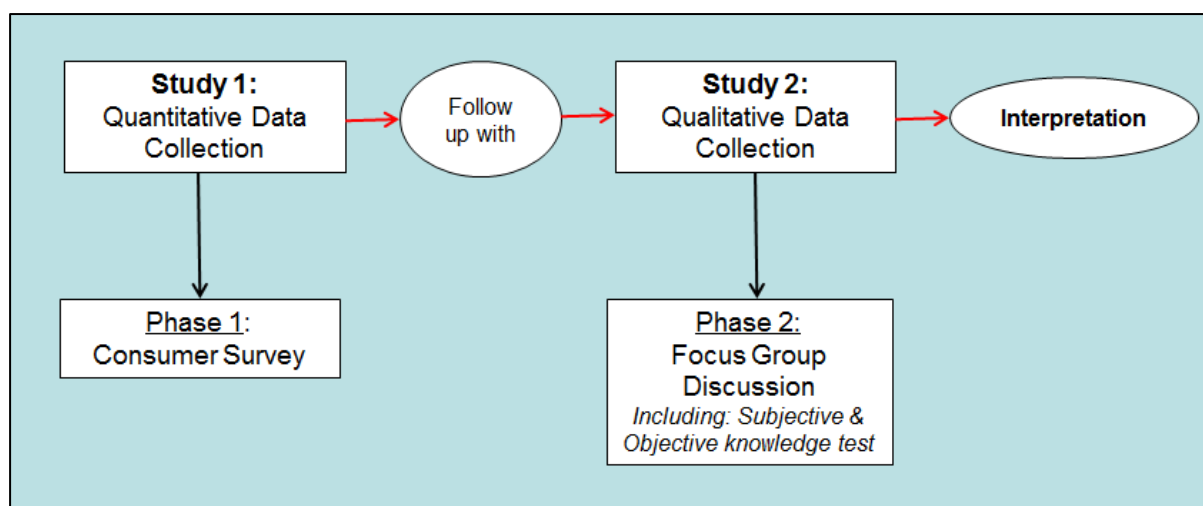


Figure 4.1: Explanatory sequential mixed methods design, adapted from Creswell (2014:220)

The explanatory sequential mixed methods design involves a two-phase project in which the researcher collects quantitative data in the first phase, analyses the results, and then uses the results to plan the second, qualitative phase (Creswell, 2014:224). In short, the data collection in this study, which involved two phases could be presented as follows.

Phase 1: Quantitative phase – Consumer survey: this comprised a structured questionnaire (quantitative investigation). The data collection for Phase 1 commenced by collecting primary responses regarding consumers’ fresh produce waste practices, as well as possible reasons for this wastage. Because the structured questionnaire (Addendum B) formed part of a more extensive investigation (titled “Food wastage, sustainability and the triple bottom line – A case study of urban households in Gauteng, South Africa”), only relevant sections from the primary questionnaire were identified and used for this study in order to ensure that the data were relevant.

Phase 2: Qualitative phase – Focus groups: this comprised two focus group discussions (Addendum E), which commenced with all of the participants completing a short subjective (Addendum C) and objective knowledge test (Addendum D). Although quantitative in nature, these short tests (subjective test: 3 questions and objective test: 10 questions) were purposively included and done prior to the discussions with the aim of assessing the groups’ knowledge in an alternative manner, which allowed for presenting and interpreting the focus group findings more meaningfully.

The study was **cross sectional**, meaning it was done in a specific context (Gauteng) at a particular time (June 2015 to July 2016). The study integrated both primary and secondary

data. The **primary data** was collected through a combination of quantitative and qualitative methods consisting of survey questionnaires and a focus group discussion, including a subjective knowledge test (10-point test) and objective knowledge test (5-point Likert scale). The **secondary data** (literature review) was compiled from various sources to indicate what had been done and published to date.

4.2 METHODOLOGY

4.2.1 Study area and unit of analysis

The unit of analysis described by Rubin and Babbie (2005:138) is defined as “people or things whose characteristics social researchers observe, describe and explain”. The selection of the unit of analysis described by Creswell (2014:217) happens automatically at the problem identification stage.

The unit of analysis for this study consisted of adult male and female consumers who resided in Gauteng. Respondents 21 years and older were recruited as it was believed that these consumers should have already gained some amount of purchasing, preparation and waste management experience.

No other limitations or requisites were set out regarding demographics, in other words, all willing individuals were welcome to partake irrespective of their gender or population group.

4.2.2 Sampling technique and size

Sampling is an essential and critical procedure within the research process as it is impossible to collect data from the entire population (Leedy & Ormrod, 2005). A sample is a sub-set of the population, only when the results can be generalised from the sample to the population do the results of the research have meaning beyond the limited setting in which they were originally obtained (Salkind, 2012:185). This implies that extreme care should be taken during the sampling process to prevent bias, and measures should also be taken to ensure that the data is credible, valid and reliable (Salkind, 2012:103). Because the study relied on collecting data in two phases, the discussion of the respective sampling techniques was also dealt with in this manner.

4.2.2.1 Phase 1: consumer survey

Convenience sampling is a non-probability sampling technique that was used due to financial and time constraints. It was envisaged to collect data from 1200 respondents across

Gauteng. The distribution of the online questionnaire took place from June to December of 2015 and a total of 1767 questionnaires were distributed. Twenty-nine trained field workers who were all students enrolled for a Consumer Science degree programme were instructed to collect the data according to electronic procedures. Convenient sampling is a less rigorous technique and involves the selection of the most accessible subjects. The advantage of convenient sampling pertains to the accessibility and speed with which data can be collected, as well as the benefit for studies with financial constraints (Areni, 2003; Salkind, 2008). The problem, however, is that convenience sampling is seldom representative in terms of the bigger population (Areni, 2003). Caution and extra care was therefore taken to recruit respondents in a responsible, structured manner that allowed the data to be collected from a diverse sample across Gauteng.

The following measures were followed in recruiting respondents:

1. Students from the Department of Consumer Science were used as field workers. The students were properly trained by the researcher to assist with the data collection.
2. The fieldworkers were well-briefed regarding the objectives set out for the study and training also included instructions on how to distribute the online survey responsibly.
3. The students received a link to distribute the online survey with a pre-condition to gather a minimum of 30 completed surveys. The Qualtrix system (online survey tool) controlled the process, and students that progressed slowly were motivated to fulfil the minimum requirements (i.e. completing 30 survey questionnaires).
4. The students were given specific geographic areas in Gauteng and expected to specifically identify potential respondents in that area to whom the students could send the link.

4.2.2.2 Phase 2: focus group discussion

During the quantitative investigation (questionnaire), respondents were asked to indicate (by providing their contact details) whether or not they would be willing to participate in the focus group. These respondents were later contacted. Ultimately, a total of 12 respondents representing the demographic profile presented by the findings of Phase 1 agreed and were recruited to partake in the focus groups. Only six participants were included per focus group in order to allow each participant enough talking time during the discussions.

According to Kumar (2011:213), qualitative research is guided by the researcher's judgment as to who is likely to provide the best information for this research area.

4.2.3 The research approach and data collection

The research approach in this study used quantitative and qualitative data collection techniques, and is presented as follows.

4.2.3.1 Phase 1: consumer survey

During Phase 1, a consumer survey was done to provide quantitative data pertaining to consumers' fresh produce wastage, as well as possible reasons for wastage. The survey entailed a self-administrated electronic questionnaire that was distributed through e-mail, as well as other respective online platforms.

The online survey tool Qualtrics was used to collect and store the data. The advantages of electronic questionnaires are that it is relatively easy and convenient in terms of time to collect data online, data is furthermore immediately available for analysis, and human error is limited through computerised capturing (Leedy, 2005). This method of data collection is also very cost-effective. According to Creswell (2014:155), "A survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population."

Because this study formed part of a more extensive investigation, extra care was taken to ensure that specific questions in the primary survey corresponded with the objectives formulated for this particular study. The selected sections were specifically chosen because they shed light on respondents' demographic information, fresh produce waste, as well as possible drivers for food waste in households.

The following section presents the relevant questions that were selected to be part of this study (see Addendum B for the full questionnaire).

A) Demographic information on the respondents

In Section A, the respondents had to provide their demographic information: gender, age, highest level of education, place of residence in Gauteng, population group, household size, monthly income, home language, marital status, number of dependents and children in household.

B) Defining food waste

In Section B, the respondents had to answer multiple questions relating to what they define food as and who they think should be held responsible for food waste.

C) Self-reported waste

In Section C, consumers were asked to answer questions regarding their consumption behaviour and how likely they were to waste certain food groups. Consumers were also asked to rank and indicate the percentage of certain food categories (Fruit, Dairy etc.) to the extent that food was wasted in their households during one calendar month.

D) Drivers/reasons for food waste

In Section D, the consumers were asked to indicate the likelihood of certain statements that cause non-consumption, poor usage and discard of food in their household. They were required to provide information on certain barriers in households causing food waste, and indicate the degree to which certain factors contributed to the wastage of fresh produce (fruit and vegetables).

E) Possible reasons for food waste

In Section E, the respondents were asked to provide possible reasons/statements that contribute towards household waste.

A variety of question types was used to obtain the desired information, including Likert-type agreement/likelihood scales, ranking scale, closed- and open-ended questions. The questionnaire was made available in English as this was found to be the most popular language used and understood by Gauteng residents. Care was taken to simplify jargon, which facilitated respondents' understanding of the questions and scales. The Department of Statistics of the University of Pretoria was also involved to ensure that the content of the questionnaire was in line with the envisaged statistical analysis. The questionnaire was pilot-tested in order to determine the relevance of the scale items, as well as the internal consistency of each category. Pilot testing specifically entailed screening the questionnaire among a sample of peers (20 who fitted the prerequisites set out for the sample) to test whether the fundamental concepts were clearly understood and that they delivered consistent responses relevant to the research objectives. This was done to ensure reliable and valid findings, as suggested by Leedy and Omrod (2013:230-231). Based on the results and suggestions made during the pilot testing, minor alterations were made in order to finalise the questionnaire.

4.2.3.2 Phase 2: focus group

Although each focus group commenced with a brief quantitative test pertaining to each consumer's subjective and objective knowledge of date labelling, the main purpose of the focus group (qualitative investigation) was to gain more depth and detail regarding consumers' knowledge of date labelling and subsequent fresh produce wastage. The findings were furthermore also used to support the findings of the qualitative investigation.

The focus groups were held on 23 May 2016 and 8 July 2016. The approach and procedures used in Phase 2 are described as follows:

Approach: The approach used assisted in understanding consumers' knowledge and subsequent interpretation of date labelling (De Vos, 1998:240). The following considerations were taken into account during the qualitative research technique (Creswell, 2014:194).

- Place: the focus group took place in a neutral environment to encourage open and honest communication between the participants. The venue was Amka Products, based in Pretoria, in a private board room that enabled a relaxed atmosphere.
- Instructions were given for the interviewer to follow so that standard procedures were used from one interview to another.
- Questions: The questions were formulated beforehand to guide the focus group discussion.
- Interview Time: Spaces between the questions were allowed to record respondents.
- Acknowledgement: A final thank you statement was sent out to acknowledge the time the interviewees spent on the interviews.
- Researcher log: A log is typically developed by the researcher to keep a record of the documents collected for analysis. The log is some form of a system to help organise the materials, i.e. video recorder transcriptions that allow for the easy retrieval of information.

The focus group discussions were planned in such a way that they suited all parties involved in terms of date, time and place. The session was held informally and participants were sent an invitation to join the session. On their arrival, the participants were all greeted and asked to get comfortable. The seating was arranged in an informal manner around a table. The participants were then firstly asked to complete the short subjective knowledge test, which included three simple questions regarding the three main dimensions of date labelling (use-by date, sell-by date and best-before/expiry date). All three questions were

self-designed and were presented in terms of a 5-point Likert type agreement scale ranging from strongly agree to strongly disagree.

The objective knowledge test, which followed the subjective test, comprised 10 scale items drawn and adapted from Brucks (1985). The areas of knowledge tested included terminology, product attributes, criteria of evaluation, and attribute co-variations. According to Veale and Quester (1994), Brucks (1985) provides insight into the appropriate measures of consumers' objective knowledge. Responses were elicited in a true or false manner (see Addendum I to review the respective subjective and objective tests).

After the completion of both tests, the test-sheets were collected and the floor opened to discuss themes regarding date labelling and consumers' interpretation thereof. This approach had its challenges, which included managing participants' air-time, minor disagreements and tendency to steer off-course. All of the focus group discussions were recorded with the consent of all the participants, where after these were transcribed and interpreted.

Procedure: Focus groups can be defined in many different ways. According to Creswell (2014:190), the researcher facilitates an informal discussion with a minimum of six to eight participants. These discussions involve unstructured and generally open-ended questions that are viewed in number and intended to elicit views and opinions from the participant. Simply put, the participants are selected by the researcher to dispute and comment on a certain topic. The participants in a focus group are often more willing to volunteer information than during a personal interview because they feel less self-conscious about sharing their experiences, and in so doing, encourage others to expose their opinions and ideas (Babbie & Mouton, 1998:292).

The **advantages** of the interviews/focus group are that (Creswell, 2014:191):

- A focus group is useful when participants cannot be directly observed.
- Participants can provide historical information.
- Group discussions allow researcher control over the line of questioning.

The **limitations** of the interviews/focus group are (Creswell, 2014:191):

- Focus groups provide indirect information filtered through the views of interviews.
- Focus groups provide information in a designated place rather than the natural field setting.
- The researcher's presence may elicit biased responses.

- Not all people are equally articulate and perceptive.

In terms of this study, the invitation to the participants indicated the main topic that was to be discussed in the focus group, i.e. date labelling. Invitations were initially emailed to prospective participants, while final participation was confirmed telephonically. The participants were informed about the date, time and venue.

Upon their arrival, all respondents were greeted, which was then followed by a brief warming-up session. All of the participants were then prompted to complete the subjective test followed by the objective test. The completed answer sheets were collected and stored. Thereafter, the researcher guided the discussion by following the themes formulated beforehand.

The following themes were formulated to address the objectives set out for Phase 2.

- ✓ What does the use-by date on fresh produce indicate?
- ✓ What does the sell-by date on fresh produce indicate?
- ✓ What does the best if used by date on fresh produce indicate?
- ✓ What is the purpose of a sell-by date?
- ✓ What is the purpose of a use-by date?
- ✓ Why do you use/evaluate the use-by date on fresh produce?
- ✓ Does price determine when fresh produce should contain a date label or not?
Why/Reason?
- ✓ Do you think non-perishable items should only contain a date label? Why/reason?
- ✓ Should items that are only high in quality contain a date label?
- ✓ Should fresh produce that is refrigerated contain date labels?

During the discussion, other topics did arise and if it was deemed relevant, these were allowed and addressed. It was important to keep consumers' opinions in mind when conducting the research, seeing that the purpose of the study was to gain insight in to consumers' endeavours (Powell *et al.*, 1997).

The group discussion was video recorded with the consent of all of the participants to ensure the accuracy of the transcriptions that were done afterwards (Babbie & Mouton, 2001:277).

4.2.4 Data analysis

As explained, this study involved two different phases and therefore generated two sets of data. The method of analysis used in each of the phases is described below.

4.2.4.1 Phase 1: consumer survey

Phase 1 of the data collection entailed the implementation of a structured online questionnaire. Data was automatically captured and coded electronically by means of the Qualtrix software. The coded data was transferred to statistical software (SPSS). The initial statistical analysis included descriptive statistics.

Descriptive statistics were implemented to visually present the results in terms of basic frequencies and tendencies. According to Cooper and Schindler (1998:430), descriptive statistics refer to the measures of location (mean, median and mode), dispersion of variability (variance, standard deviation and range) and measures of shape (skewness). In terms of this study, this included the presentation of the data in a more comprehensible format, i.e. graphs and frequency tables. This was followed by **Inferential statistics**, which included an Exploratory Factor Analysis (EFA). Factor analysis is a statistical procedure used to identify the coherence of items and relationships that exist among a large number of variables and can be used for either exploratory or confirmatory purposes (Mazzocchi, 2008:221). Exploratory factor analysis is used to search for a possible underlying structure in the variable without forcing items into specific factors (Marx-Pienaar & Erasmus, 2014:125). The factors derived from the Exploratory Factor Analysis (EFA) were then compared (ANOVA) across the relevant demographic categories to identify significant differences. Where significant differences were identified, a subsequent post-hoc test was required and thus implemented.

4.2.4.2 Phase 2: focus group discussion

According to Rubin and Babbie (2005:552), qualitative data analysis can be regarded as the techniques with which researchers convert data to a numerical form and subject it to a statistical analysis (De Vos *et al.*, 2011:16). In contrast, qualitative data analysis is described by De Vos *et al.* (2011:339) “as a process of inductive reasoning, thinking, and theorizing which certainly is far removed from structured, mechanical and technical procedures to make inferences from empirical data social life.”

The analyses of the focus group data firstly required the transcription of all video and audio recordings. While transcribing, the researcher had to be careful to maintain the integrity of the focus group discussion, in other words, not changing the wording, language use or grammar, as well as adding as much content as possible. This was followed by a **content analysis** of the transcriptions. A content analysis implies the identification and clarification of key

concepts in the study, and also indicating how these concepts are related to existing theory. This was done by hand using colour coding to identify the relevant concepts within the transcribed text. Brown (2011) explains that this process (axial coding) not only allows the identification of concepts, but also the identification of possible relationships or connections between different concepts. Colour coding furthermore allowed the grouping of concepts in terms of respective categories or themes that coincided with the applicable theory. This allowed the researcher to draw conclusions in terms of narratives, thus avoiding unnecessary quantification of information (Berg & Lune, 2011:238; Mayring, 2000). For complete transcripts of the focus group discussions, see Addendum F.

Data analysis pertaining to the **subjective and objective knowledge tests** implemented in Phase 2 also included **descriptive statistics** and the results were presented in terms of graphs and relevant frequency tables.

The subjective knowledge test: responses were elicited by means of a 5-point Likert-type agreement scale. The responses were summated, followed by a calculation of the total means. A higher mean score was interpreted as a positive indication of a respondent's subjective knowledge. The means for the subjective knowledge test ($M_{\text{MAXIMUM}} = 5$) were interpreted according to the respondent's level of agreement with 1 (strongly disagree) meaning poor knowledge, 2 (disagree) equating to average knowledge, 3 (neither agree nor disagree) referring to average knowledge, 4 (agree) implying good knowledge, and 5 (strongly agree) meaning excellent knowledge.

The objective knowledge test: responses pertaining to the objective knowledge test were summated. This was followed by calculating each of the individual respondent's total means, which were expressed in terms of a percentage value ($M_{\text{maximum}} = 100$). The mean value can be described as the sum of a set of scores divided by the numbers of scores (Salkind, 2014). The means for the objective knowledge test were interpreted as follows: a score < 50% was interpreted as a poor reflection of objective knowledge; 50 > 60%: average; 60 > 70%: above average; 70 > 80%: good; 80 > 90%: very good, and $\geq 90\%$: excellent.

4.2.5 Operationalisation and conceptualisation

The operationalisation of the measures was done in terms of the research objectives and sub-objectives for this study. Table 4.1 indicates the objectives of this study, along with the dimensions, questions and types of statistical methods used.

Table 4.1: Conceptualisation and operationalisation table

| Sub objectives | Dimensions | Indicators | Measurement | Data Analysis |
|---|---|---|---|--|
| 1. Fresh produce wastage | | | | |
| Exploring consumers' fresh wastage practices in order to identify date labelling as a pertinent reason for unnecessary fresh produce wastage. | | | | |
| 1.1 Consumers' current self-reported fresh produce wastage practices. | Fresh produce. | Fruit; Vegetable (Commodity specified). | Electronic Questionnaire using online survey tool: Qualtrics. (Phase 1) Questions: Close coded. 29; 34-35 | Mean value, percentage values & descriptive statistics. |
| 1.2 Date labelling as a prominent reason for unnecessary fresh produce waste. | Date Labelling. | Sell-by; Use-by; Expiry. | Electronic Questionnaire using online survey tool: Qualtrics. (Phase 1) Questions: Close coded 20-28, 32, 46-51, 35-41 | EFA (Exploratory Factor Analysis), Cronbach's Alpha, Mean value, T-test & ANOVA. |
| 2. Consumers general knowledge of date labelling | | | | |
| To explore consumers' general knowledge of date labelling (in terms of subjective and objective knowledge dimensions) in order to describe current misinterpretation of date labelling, which contributes to unnecessary fresh produce wastage practices. | | | | |
| 2.1 Subjective knowledge | Subjective knowledge. | Sell-by; Use-by; Best-before. | Focus group discussion (Phase 2) Subjective knowledge test: 5-Point Likert type scale ranging from strongly agree to strongly disagree. | Content analyses. Descriptive statistics. Percentage values. |
| 2.2 Objective knowledge | Objective Knowledge | Sell-by; Use-by; Best-before. | Focus group discussion (Phase 2) 10-point test consisting of true/false questions. | Discriptive statistics. Percentages, mean value. |
| 3.Possible avenues that could be implemented | | | | |
| To identify and propose Possible avenues that could be implemented to mitigate consumers' misinterpretation of date labels and thus curb unnecessary fresh produce waste. | Misinterpretation of date labelling resulting in fresh produce waste. | Reasons for wastage. | Electronic Questionnaire using online survey tool: Qualtrics. (Phase 1) Questions: Open ended question 31 & 32. | Descriptive statistics. |

4.3 QUALITY OF DATA

In order to ensure that the findings of the study can be considered as facts that could be used in future literature in the academic community, it is important to attend to the quality of the study. The quality of the data determines the success and publishability of the research. The quality of the research design and methodology was therefore addressed, as well as the validity and reliability of the measuring instruments. De Vos *et al.* (2011:172) confirm Salkind's (2006:113) definition of validity, namely that validity refers to "truthfulness, accuracy, authenticity, genuineness and soundness as symptoms for validity, and stresses the fact that these terms describe what validity is all about: that the test or instrument you are using actually measures what you need to have measured." Moreover, De Vos *et al.* (2011:177) also confirm Salkind's (2006: 106) definition of reliability, namely, that reliability refers to "dependable, consistent, stable, trustworthy, predictable and faithful as symptoms for reliability."

The following was done to limit error that might obstruct the validity and reliability of the data.

4.3.1 Conceptualisation: theoretic validity

Concepts provide the primary building blocks of scientific knowledge and are known as man-made terms that may or may not exhibit a close relationship to reality (Kerlinger & Lee, 2000; Mouton, 1996:181). If concepts are poorly planned and conceptualised, the research, however carefully executed, will fail. Conceptualisation thus refers to the process of categorising and labelling concepts and information (De Vos *et al.*, 2011:29).

To enhance the theoretical validity of the study, the literature was extensively reviewed to ensure the identification and clarification of concepts, and a conceptual framework was used to direct the research process.

The validation included the important and relevant concepts used in this study: fresh produce, date labelling, consumer knowledge, and household waste practices. Both phases of this research (online questionnaire and focus group discussion) were identified through the literature review that was done before the completion of the research design.

4.3.2 Measuring validity

Validity within a research study refers to the accuracy, meaningfulness, and credibility of the study as a whole. A research study is only valid when the conclusions are meaningful and

defensible and can be drawn from the data that is obtained. There are four traditional forms of validity to look at: content validity, face validity, criterion validity, and construct validity.

4.3.2.1 Content validity

According to Babbie (2007:147), content validity has to do with the degree to which a measure covers the range of meanings included within a concept. De Vos *et al.* (2011:173) also refers to Punch's (2005:97) statement that a valid measure should provide a representative sample of all content, or elements of the phenomenon being measured.

Content validity therefore refers to the means of the measurement and represents all possible questions needed to study the problem at hand. In this study, the questionnaire, subjective and objective test, and the focus group discussions represent the questions and themes needed to study the problem at hand, which are consumers' objective and subjective knowledge dimensions and misinterpretation of date labelling as a reason for fresh produce wastage in households.

To ensure content validity in all main concepts and their significant dimensions, indicators were carefully identified to guarantee accurate representation in this study.

4.3.2.2 Face validity

The face and content validity have been used in both the quantitative and qualitative research processes.

According to Kumar (2011:179-180), this validity is very easy to apply. Every question in the study must have a logical link to an objective. Face validity establishes the link between the questions and objectives. It is important that the questions cover every part of the issue or attitude being measured. Content validity assesses the items of an instrument to ensure that it covers everything. It can be summarised that face validity does not refer to what an instrument *actually* measures but rather to what it *appears* to measure (De Vos *et al.*, 2011). When a test does not appear to be measuring what it supposed to, it is said to have low face validity.

To ensure face validity, all of the main concepts in the instruments were structured not only to measure the attributes under consideration accurately, but also to *appear* as a relevant measure of the study attributes (De Vos *et al.*, 2011).

4.3.2.3 Criterion validity

Criterion validity involves multiple measurements and is established by comparing scores on an instrument known to measure the concepts and behaviour being studied. Criterion validity moves away from subjective assessments of face validity and provides more objective evidence of validity (De Vos *et al.*, 2011:174).

If a criterion is chosen that is unreliable, the researcher will be unable to validate the instrument adequately, therefore it is important that the criterion itself should be reasonably valid and reliable (De Vos *et al.*, 2011:174).

For this study, prompts were given and questions asked relating to consumers' date labelling knowledge in terms of the objective knowledge and subjective knowledge dimensions (Phase 2). The answers were then later comparatively interpreted in order to gain insight into consumers' knowledge of date labelling and to identify how consumers' subjective and objective knowledge could contribute to fresh produce household waste practices in Gauteng.

4.3.2.4 Construct validity

For the purpose of this study, the focus was on construct validity. Construct validity examines whether test performance reflects an underlying construct or set of related variables. According to Salkind (2012:125), this type of validity enables one to link practical components of a test score to some underlying theory or model of behaviour. Construct validity was ensured through a well-structured literature review that specified the relevant concepts, as well as proper conceptualisation.

4.3.3 Sampling: representativeness

According to De Vos *et al.* (2011:226), a representative sample is important when we want to generalise from the sample to the larger population. To ensure that the sample provided valid information that is representative of the target population, the participants were selected purposively across the larger area of specific geographic locations (suburbs), yet these were conveniently on the basis of pre-determined criteria.

4.3.4 Data collection: reliability

Reliability is defined as when a study asks "the same questions to a similar sample" and then produces "the same findings" (Schiffman & Kanuk, 2010:58). Therefore, it means that a test

measures the same thing more than once and results in the same outcomes, giving consistent results.

The reliability of the study was ensured by increasing the sample size (the greater the sample, the greater the chances are of the study being representative and reliable); removing ambiguous items (if an item is unclear it is unreliable); standardising test conditions; moderating test conditions, which should apply at all times (if a test is too difficult or too easy, it will not reflect true occurrences); and maintaining consistent scoring procedures, especially when evaluating the final results.

To reduce possible sources of error during data collection in Phase 1 (Consumer survey), which was done by means of questionnaires, several precautions were taken. A cover letter was attached to the questionnaire to clarify the purpose of the survey, the researcher's affiliation and that confidentiality and anonymity were guaranteed. The questionnaire was constructed in such a way that it would not take too much time to complete. The questions were formulated in such a way that they were easy to interpret and understand. The questionnaire was pre-tested with 20 candidates, which complied with the pre-requisites of the study to ensure understandability and to determine the time required for completion. The pilot-test respondents were asked to provide feedback regarding the complexity of the questions, as well as any other problems that they encountered. Minor changes were then made to the instructions in the questionnaire in order to prevent confusion during the final data collection procedure.

The questionnaire was distributed electronically, and the respondents' feedback was easily monitored on the Qualtrics online survey system. This made it convenient for the researcher to gather quantifiable data until the saturation point had been reached to enable a representative sample. Internal consistency was calculated (Crombach Alpha) for the scale and reflects the degree to which each item in a scale correlates with each other item on the scale. These values typically range from 0 – 1, the greater the internal consistency of a measure, the greater the extent to which each item is measuring the same construct.

4.3.5 Data analysis: inferential validity

Inferential validity is a measure that ensures that a statistical inference about a larger population from a small population is valid (Leedy & Ormrod, 2005:252). The Department of Consumer Science and the Department of Statistics at the University of Pretoria were used to ensure that the questionnaire was structured correctly and that the data was analysed

correctly in terms of the statistics procedure that was chosen and in terms of the objectives of the study.

4.4 ETHICS

Ethical behaviour is of utmost importance prior, during, and after conducting a study as ethical conduct begins and ends with the researcher (Neuman, 1997:443). Due to the importance of ethical behaviour in social research, the following was done to ensure and protect the research party. The respondents who partook in the study did so voluntarily. The purpose of the study was explained thoroughly to the respondents who decided to partake in the study. Before the respondents completed the questionnaire, they were asked to sign a consent form ensuring that an ethical code of practice was followed throughout the study. The consent form served to ensure ethical behaviour throughout the study (Salkind, 2012:86). The consent form was first approved by the Ethics Committee of the Natural and Agricultural Faculty of the University of Pretoria.

The confidentiality of each respondent was preserved as no names and personal details were required except for supplying a cell phone number or any other contact information as a means to assist in the identification process. The researcher adhered to the highest possible technical standards during the research. The researcher did not change the results of the data. The methodology and research techniques that were used, as well as the research results were disclosed. One of the most important ethical principles was acknowledgement, which was closely adhered to in this study.

4.5 SUMMARY

The appropriate research design and methodology were carefully considered to ensure that the best possible research methods were used with the resources available in this study. Data collection was executed in two phases by using an electronic questionnaire to gather data in Phase 1 – this related to consumers' current fresh produce household waste practices, the reasons/methods for unnecessary fresh produce waste, and to identify possible avenues and suggestions that might address household food waste. During Phase 2, two focus group discussions were conducted in order to gain deeper insight into what consumers' think they know (i.e. subjective knowledge) but also to review their actual knowledge (i.e. objective knowledge) about date labelling. To support the qualitative findings regarding consumers' subjective and objective knowledge, it was decided to also include a short 5-point

Likert type scale test measuring the respondents' subjective knowledge and a 10-point scale measuring their objective knowledge.

Connecting the data means that the analysis of one data set was used to lead into or build into the second data set. Data analysis in mixed methods, as described by De Vos (2011:447), consists of analysing the quantitative data using qualitative methods, and qualitative data using quantitative methods and procedures. "It involves the processes whereby quantitative and qualitative data analysis strategies are combined, connected and integrated in research studies" (De Vos *et al.*, 2011:447). Merging the data involves combining the quantitative and qualitative data through the procedures of a side-by-side comparison, data transformation, or a joint display (Creswell, 2014:230).

The collection and analysis of the data was executed in a manner that focused on the quality of the research project throughout the entire process. Therefore, throughout the study, validity and reliability were implemented to enhance the quality of the study. Ethical guidelines for research were further implemented to ensure that the quality of this project was acceptable.

Chapter 5 provides the results of Phase 1 and 2 and a discussion of each in light of the objectives, aims, and research questions posed in this study.

CHAPTER 5 RESULTS AND DISCUSSION

This chapter presents the results as well as a discussion in terms of the objectives of this study.

5.1 INTRODUCTION

In this chapter, the results of the study will be presented and discussed in accordance with the objectives set out for this study. The initial discussions will commence with a presentation of the demographic characteristics of the selected sample.

The discussion of the findings will commence with the data collected during Phase 1, which will provide a general overview of the respondents' food waste practices, as well as pertinent reasons for wastage. This will be followed by a discussion on the data collected during Phase 2, which will explore the respondents' knowledge of date labelling and the impact thereof on their waste practices. The chapter will conclude with the findings pertaining to possible mitigating strategies, as proposed by the sample.

5.2 5.1 DEMOGRAPHIC PROFILE OF THE SAMPLE

The respondents' gender, age, marital status, household income, education level, home language and population group formed part of the demographic information requested in section one of the questionnaire (Addendum B). This enabled the interpretation of findings in terms of subsets of the sample. Table 5.1 presents the demographic characteristics of the sample.

5.2.1 Gender distribution

The findings regarding the gender distribution indicated that more than half of the sample, 62.0% (n = 1096) were females compared to the males, who comprised 26.90% (n = 475). The number of respondents who did not indicate their gender was 11.10% of the sample (n=196).

A majority of females was not viewed as a concern as one of the requirements for participation was that the respondents had to be the primary decision makers in terms of food purchasing, preparation and waste management. Although South Africa (SA) has shown some improvements in terms of liberating women, most households in SA still follow traditional gender roles where females are still in charge of daily food and household chores (Melorose, Perroy, & Careas, 2015). According to gender statistics (StatsSA, 2016), the population of Gauteng in SA is dominated by females and therefore it is considered that their

views on pertinent issues such as food wastage are valuable. These demographics are further presented in Table 5.1 below.

Table 5.1: Demographic characteristics (n=1767)

| DEMOGRAPHIC CHARACTERISTICS | | FREQUENCY | PERCENTAGE |
|-----------------------------|--|-----------|------------|
| Gender (N=1767) | Male | 475 | 26.90 |
| | Female | 1096 | 62.0 |
| | Missing | 196 | 11.10 |
| Age (N=1767) | 21 – 23 years | 545 | 30.84 |
| | 24 – 30 years | 394 | 22.30 |
| | 31 – 40 years | 211 | 11.94 |
| | 41 – 50 years | 210 | 11.89 |
| | 51 – 60 years | 181 | 10.24 |
| | 61+ years | 47 | 2.66 |
| | Missing | 179 | 10.13 |
| Marital Status (N=1767) | Single without children / divorced / widowed | 740 | 41.88 |
| | Single with children | 100 | 5.66 |
| | Couple / Married (without children) | 234 | 13.24 |
| | Couple / Married (with Children) | 501 | 28.35 |
| | Missing | 192 | 10.87 |
| Household Income (N=1767) | Less than R10 000 | 342 | 19.36 |
| | R10 001 – R15 000 | 2 | 0.11 |
| | R15 001 – R20 000 | 212 | 12.00 |
| | R20 001 – R30 000 | 211 | 11.94 |
| | R30 001 – R40 000 | 196 | 11.09 |
| | More than R40 000 | 551 | 31.18 |
| | Missing | 253 | 14.32 |
| Education Level (N=1767) | Lower than grade 12 | 30 | 1.70 |
| | Grade 12 | 517 | 29.26 |
| | Grade 12 plus a degree or diploma | 703 | 39.78 |
| | Post graduate degree | 364 | 20.60 |
| | Missing | 153 | 8.66 |
| Home Language (N=1767) | Afrikaans | 699 | 39.56 |
| | English | 696 | 39.39 |
| | Ndebele | 8 | 0.45 |
| | Northern Sotho | 21 | 1.19 |
| | Sotho | 7 | 0.40 |
| | Swazi | 12 | 0.68 |
| | Tsonga | 7 | 0.40 |
| | Tswana | 17 | 0.96 |
| | Venda | 9 | 0.51 |
| | Xhosa | 14 | 0.79 |
| | Zula | 19 | 1.07 |
| | Other | 65 | 3.68 |
| | Missing | 193 | 10.92 |
| Population Group (N=1767) | African | 239 | 13.52 |
| | Asian | 4 | 0.23 |
| | Coloured | 18 | 1.02 |
| | Indian | 19 | 1.08 |
| | White | 1313 | 74.31 |
| | Other | 11 | 0.62 |
| | Missing | 163 | 9.22 |

5.2.2 Age

In order to participate in the research project, the participants had to be 21 years and older. They had to specify their exact age in an open question, which was converted into six categories for the purpose of statistical analysis. The grouping of the different categories was done on the premise that the different groups not only found themselves in similar life stages, but may also have had similar perceptions and expectations (Patchen, 2006; Atkins & Hyun, 2016).

The predominance of younger respondents was considered positive as research suggests that compared to older generations, younger individuals are often more willing to mitigate unsustainable behaviour (Poortinga, Spence, Whitmarsh, Capstick & Pigeon, 2011). Parfitt *et al* (2010) furthermore raise concern that the behaviour of young individuals in particular needs attention as it was found that they tend to waste more than their older counter parts (Lyndhurst, 2007; Hamilton, Denniss & Baker, 2005).

5.2.3 Marital status and household size

In terms of marital status, 41.88% (n=740) of the sample was either single or divorced. Married or long-term couples without children contributed 13.24% (n=234) of the sample, whereas couples with children made up 28.35% (n=501).

Household composition and structures are rapidly changing in South Africa (StatsSA, 2017). Today, the average South African household size has declined by one household member. Current statistics indicate the average size to include 3.5 members compared to the 4.6 members recorded during the 1996 census. The findings from this study reveal an average household size of 3-4 members, reflecting the principle household structure of the geographic area (City of Tshwane, 2011). According to Parfitt *et al*. (2010), food wastage is significantly influenced by the composition of the family, with adults wasting more in absolute terms than children, and larger households wasting less per person than smaller households. Single person households tend to throw away more per capita, and households with children tend to waste more than households without children, although rates vary according to the children's age.

5.2.4 Household income

The findings presented in Table 5.1 indicate that more than half (54.22%) of the respondents (n=958) earned more than R 20 000 per month. According to the South Africa Bureau of Market Research (BMR, 2012), households that earn an income of R25 000 – R45 000 per

month are classified as the realised middle class. Alternatively, households that earn more than R45 000 per month are classified as the upper middle class.

Ramukhwatho, Plessis and Oelofse (2014) acknowledge that a household's income does influence the type and amount of food wasted in SA households. According to WRAP (2007a), lower income consumers waste more food because they are less likely to plan their shopping and have a 'live for today' attitude.

5.2.5 Level of education

Table 5.1 shows that almost 60% of the sample was well educated. Although the literature states that more educated consumers tend to be more concerned about issues such as food waste (Marx-Pienaar & Erasmus, 2014), it was comforting to note that a sizeable number of less educated consumers were also recruited to enable a comparison of groups with notably different levels of formal education.

5.2.6 Home language

The results in Table 5.1 indicate that the majority of the sample was Afrikaans (n=699 / 39.56%), followed by English (n=696 / 39.39%). Only 6.45% of the respondents (n=114) indicated that one of the African languages was preferred as their home language. When considering the mitigation of fresh produce wastage as a result of date label misinterpretation, the fact that South Africa has eleven official languages and numerous dialects is particularly worrisome as this could mean that a vast number of SA consumers might struggle to read/interpret labelling information, which could therefore contribute to fresh produce wastage (SSA, 2012).

5.2.7 Population group

Even though this research project never aimed to distinguish between the perceptions of different population groups, the respondents were still asked to indicate which population group they belonged to according to the South African Equity Act (No.55 of 1988). Six categories were distinguished in the questionnaire and are presented in Table 5.1.

According to the results in Table 5.1, the majority of the sample 74.31% (n=1313) were White with 13.52% (n=239) representing the African population group. In the South African statistics municipal report (2011:7), it is clear to see that there are more African individuals (75.9%) than White individuals (20.2%). This confirms that this sample does not represent the bigger population. The predominance of the white population could largely be ascribed to the

convenience sampling method, but as mentioned before, it was never the intention of this study to specifically focus on differences between the population groups.

5.3 DATA ANALYSIS, RESULTS AND DISCUSSION

The discussion of the results pertaining to Phase 1 will follow in a sequential order according to the objectives formulated for this specific research phase:

Current fresh produce waste practices (Objective 1.1).

Date labelling as a pertinent reason for discarding fresh produce (Objective 1.2).

5.3.1 Consumers' fresh produce wastage practices and pertinent reasons for this wastage (objective 1)

The initial results in the following section (Section 5.3.1.1) are descriptive in nature and aim to provide some background concerning consumers' current food, but in particular, fresh produce wastage (Objective 1.1). Section 5.3.2 will present the findings regarding (Objective 1.2) pertinent reasons for fresh produce wastage based on the EFA (Exploratory Factor Analysis) results.

5.3.1.1 Self-reported fresh produce wastage

In order to investigate not only current consumer food wastage, but fresh produce as an area of concern, the respondents as consumers were asked to rank the 12 prominent food categories according to the extent that each was wasted in their households during the last calendar month (respondents were prompted to use a rating scale where 1 = category mostly wasted, and 12 = category least wasted). The means were determined for each of the categories. Lower means were interpreted as concerning as these were indicated as categories where the most was wasted. The respondents' ranking of wastage is depicted in Figure 5.1 below.

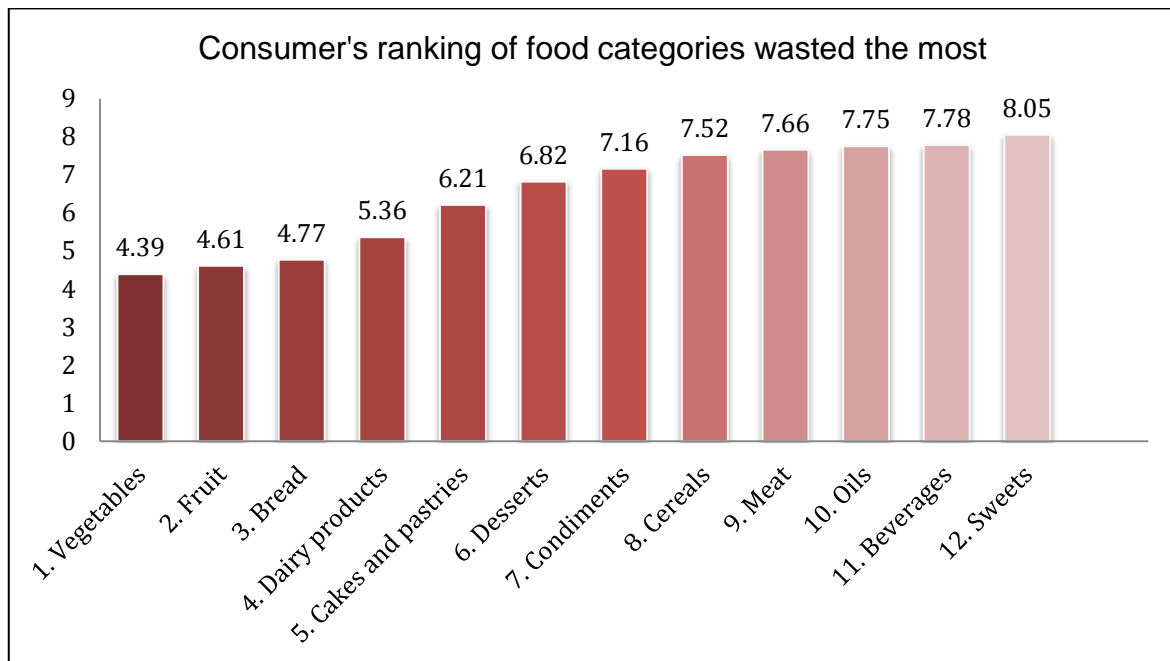


Figure 5.1: Consumer's self-reported ranking of food categories wasted the most (n=1154)

In order to determine the actual amount of food wasted per category, the respondents were prompted to use a slider scale marked in terms of percentiles to indicate the amount of food wasted (per category) during one calendar month.

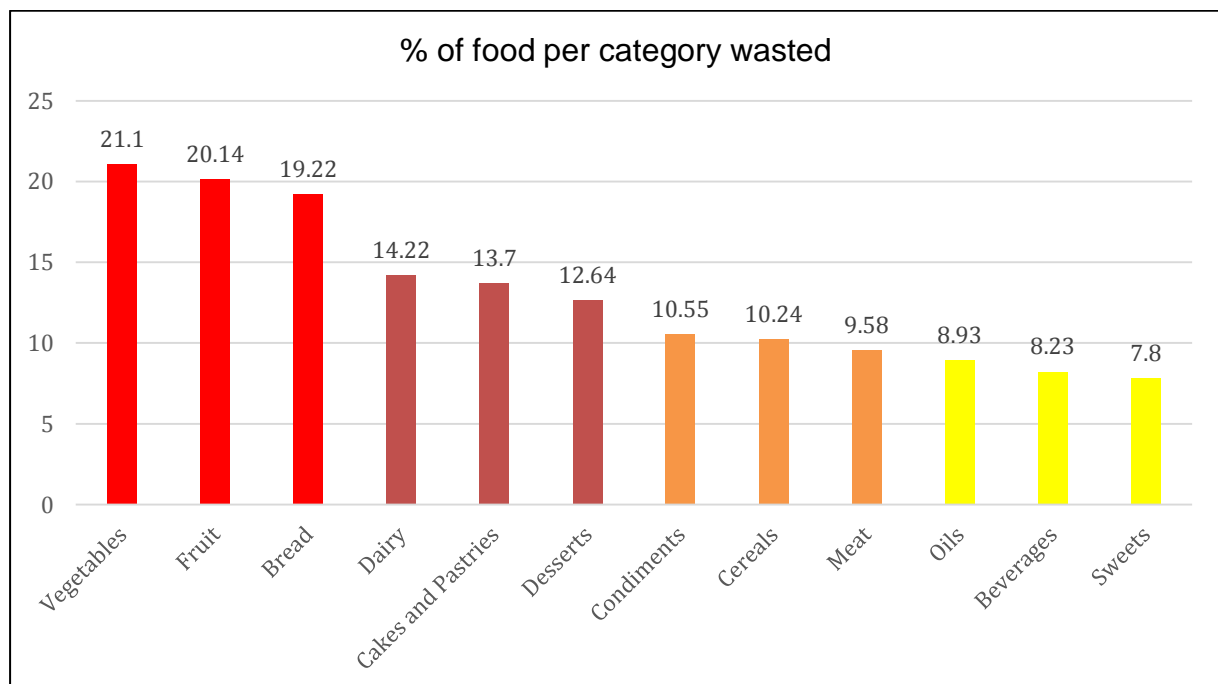


Figure 5.2: Consumer's self-reported estimates (%) of food per category wasted (n=1154)

The findings presented in Figure 5.1 indicate that the respondents mostly wasted fresh produce, in particular, vegetables ($M = 4.39$), closely followed by fruit ($M = 4.61$). In terms of food categories wasted the least, it was interesting to note that meat (which is considered as

a more expensive food category) ($M = 7.75$) and sweets (which is considered a luxury food category) ($M = 8.05$) were least likely to be wasted.

In terms of the actual amount of fresh produce wasted (Figure 5.2), the respondents indicated that of the total amount of vegetables purchased, an estimate of 21.1% was wasted per month compared to fruit wasted, which was estimated at 20.14%.

These results support the findings of previous research done by Nahman and de Lange (2013), as well as Parfitt *et al.* (2010), which indicated that fresh produce accounts for the highest proportion of food wasted amongst households locally and globally. Most studies that have sought to identify the main food types wasted have found that perishable food items are usually ranked first (Parfitt *et al.*, 2010). These results are furthermore corroborated by a study done by Wrap (2013), which indicated that fresh produce is by far the most concerning food category that is wasted globally.

5.3.1.2 Fresh produce waste per category

To investigate consumers' wastage of fresh produce in terms of specific product types, the respondents were asked to reflect on their consumption during the last calendar month and then indicate their likelihood of product wastage. A 4-point Likert type – likely-hood scale was used. A higher mean score was interpreted as a fresh produce category that was likely to be wasted by most of the respondents. The results are summarised and presented in Figure 5.3.

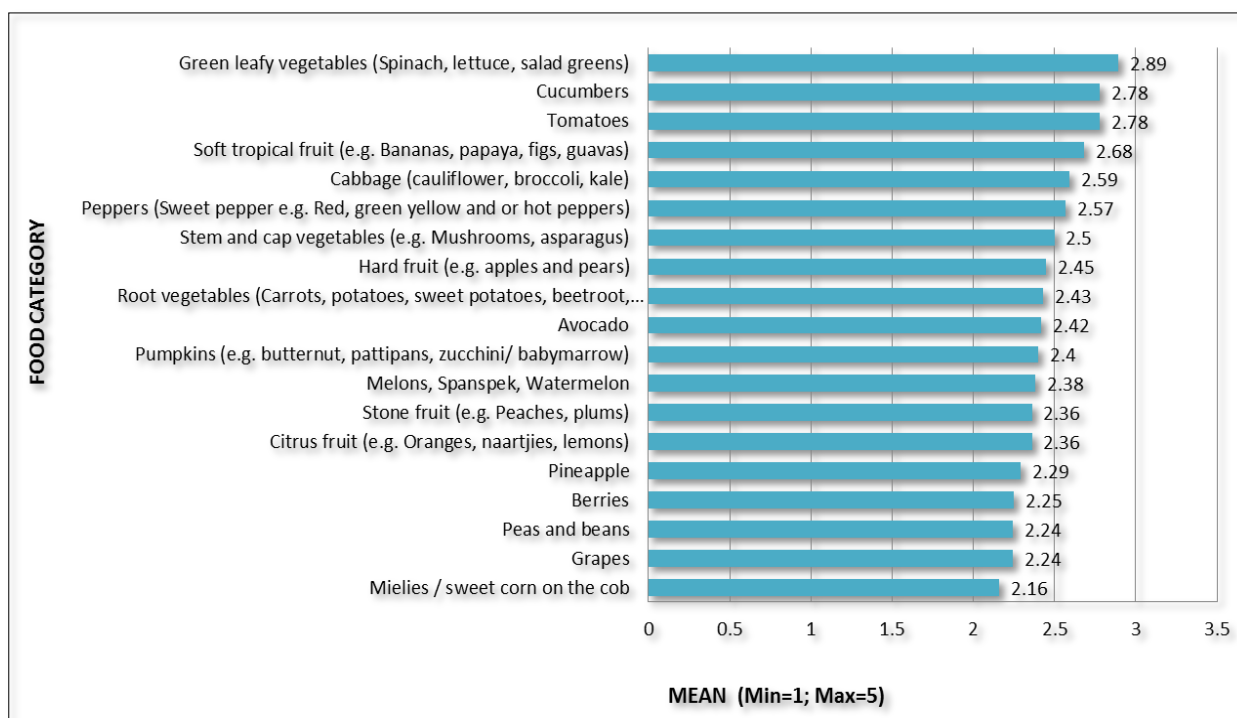


Figure 5.3: Most likely fresh produce wasted per category (n=1274)

The results in Figure 5.3 indicate that green leafy vegetables (Mean = 2.89) such as salad greens, lettuce and spinach were likely to be wasted the most by respondents, closely followed by tomatoes (Mean = 2.78) and cucumbers (Mean = 2.78). Possible reasons for this could be the recent surge in health and wellness trends that emphasise the health benefits associated with the consumption of products such as green leafy vegetables (Cook, 2004).

Fresh produce product categories that could be viewed as less likely to be wasted included peas and beans (pulses) (Mean = 2.24), grapes (Mean = 2.24) and corn (Mean = 2.16). Possible reasons for lower wastage amongst these commodities might include the fact that pulses are not a very popular product but are also more shelf stable due to their dehydrated form. Grapes are often a more expensive food item and for that reason might be consumed more responsibly.

5.3.2 Date labelling as a pertinent reason for discarding fresh produce

5.3.2.1 Reasons for fresh produce waste practices in households

Not much research has been done within the South African context regarding reasons for fresh produce wastage amongst households. However, previous research done in the US found that date labelling does have an influence on household food waste practices (Lyndhurst, 2011; Newsome *et al.*, 2014).

In order to investigate possible reasons for consumers' fresh produce wastage, the respondents were subjected to a pool of 46 questions that was self-designed in order to determine if date labelling is a pertinent reason for discarding fresh produce. A Four-point Likert-type agreement scale with increments ranging from Strongly Disagree to Strongly Agree was used. To summarise and reduce the items in terms of coherent constructs, an Exploratory Factor Analysis (EFA) was performed using the **maximum likelihood** method and an **Oblimin with Kaiser normalization rotation method** with Eigen values > 1, which indicated that the data followed a normal distribution as the condition, with a criterion of $p > 0.05$. The respondents with missing data were excluded from the analysis by implementing the 'exclude listwise' function within SPSS. Therefore, only complete responses were used. Please refer to the operationalization table 4.1 for more detail regarding the scale design.

Seven factors, which retained 39 of the 46 original scale items, were identified. Items that were omitted were as a result of low communalities and because they did not load on any of the respective factors in a logical manner. The Cronbach's Alphas and means were determined for each of the factors. The results in terms of the Cronbach's alphas ranged between 0.763 and 0.940, which was considered acceptable. The means greater than two

were considered as a positive indication that the specific factor positively contributed towards consumers' fresh produce wastage.

Figure 5.4 presents the content of the seven factors and the relevant statistical values. A thorough investigation of the seven factors and their respective items allowed the identification of suitable factor labels, namely:

Factor 1: **Lack of skills and knowledge/information**, which reflects on insufficient and incorrect knowledge or information on storage and preparation of the product.

Factor 2: **Date labelling**, which reflects buying too close to the sell-by, use-by and expiration dates and thus leads to waste.

Factor 3: **Health & Safety**, which reflects the products' health and safety when a product might seem slimy/mouldy or smell bad.

Factor 4: **Planning & purchasing**, which refers to buying more than what one needs, resulting in buying in bulk and in large quantities, preparing too much, and not planning menus and purchases.

Factor 5: **Marketing and Trends**, which refers to promotional materials in the store.

Factor 6: **Packaging and storage**, which refers to packaging function and usage.

Factor 7: **Product Appearance**, which refers to the appearance of a product such as being bruised, deformed, blemished, rotten or old.

The respective factor means revealed that the respondents mostly agreed with the content of Factor 3 (Health and safety) (Mean = 2.68), Factor 4 (Planning and purchasing) (Mean = 2.33) and Factor 7 (Appearance) (Mean = 2.16). With regard to Factor 1 (Lack of skills and knowledge), Factor 5 (Marketing and trends), and Factor 6 (Packaging and storage), the respective factor means (Means = 1.33 to 1.88, $M_{\text{MAXIMUM}} = 4$) revealed that respondents mostly disagreed with the contents, and it is therefore unlikely that these factors contributed to respondents' fresh produce wastage.

Although the mean of Factor 2 (Date labelling) was just below two (Mean = 1.90) and therefore indicates that the respondents neither agreed nor disagreed that date labelling contributes to their fresh produce wastage, it is still reviewed as a matter of contention, and in terms of this study, justifies further investigation. The literature notes that consumers often have difficulties in understanding date labelling, which potentially encourages wasteful behaviour (EPRS, 2015). In a recent article published, spokesperson Professor Sigger from the Food Science Department of the University of Stellenbosch suggested that South African

consumers need to be educated on how to interpret date labelling (Knowler, 2016). Factors representing the dimension of consumers' household waste practices are presented in Figure 5.4 below.

| ITEMS | FACTORS | | | | | | |
|--|---------|--------|-------|-------|--------|-------|--------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| We waste because we buy too large quantities. | 0.239 | -0.465 | 0.168 | 0.776 | -0.419 | 0.382 | -0.317 |
| We waste because we buy in bulk. | 0.344 | -0.503 | 0.154 | 0.588 | -0.531 | 0.376 | -0.338 |
| We waste because we buy too close to the sell by date. | 0.397 | -0.907 | 0.23 | 0.365 | -0.446 | 0.342 | -0.374 |
| We waste because we buy too close to the expiry date. | 0.355 | -0.911 | 0.174 | 0.367 | -0.413 | 0.315 | -0.303 |
| We waste because we buy too close to the "use by" date. | 0.383 | -0.934 | 0.212 | 0.376 | -0.432 | 0.333 | -0.374 |
| We waste because we do not plan our purchases. | 0.335 | -0.453 | 0.112 | 0.686 | -0.43 | 0.244 | -0.23 |
| We waste because we buy more than we need. | 0.259 | -0.442 | 0.187 | 0.814 | -0.434 | 0.3 | -0.302 |
| We waste because the amount per pack is more than we can consume. | 0.147 | -0.373 | 0.258 | 0.621 | -0.275 | 0.439 | -0.226 |
| We waste because we do not have sufficient or correct storage space available (freezer/refrigerator). | 0.447 | -0.388 | 0.161 | 0.295 | -0.443 | 0.529 | -0.343 |
| We waste because we are not properly informed about the perishability of the product. | 0.579 | -0.426 | 0.191 | 0.2 | -0.456 | 0.704 | -0.412 |
| We waste because the amount per pack exceeds the amount that can be consumed before the product loses quality. | 0.147 | -0.315 | 0.293 | 0.498 | -0.266 | 0.57 | -0.252 |
| We waste because the packaging does not provide proper protection to the product. | 0.317 | -0.31 | 0.252 | 0.241 | -0.396 | 0.684 | -0.324 |
| We waste because the packaging is difficult to empty. | 0.436 | -0.332 | 0.184 | 0.202 | -0.403 | 0.637 | -0.393 |
| We waste because, once opened, the packaging cannot be resealed. | 0.215 | -0.337 | 0.305 | 0.374 | -0.361 | 0.605 | -0.327 |
| We waste because we do not have proper information regarding correct storage. | 0.633 | -0.472 | 0.157 | 0.218 | -0.517 | 0.705 | -0.417 |
| We waste because we often forget about the product in storage. | 0.176 | -0.273 | 0.311 | 0.478 | -0.311 | 0.26 | -0.255 |
| We waste because pests might infest the product in storage. | 0.369 | -0.276 | 0.302 | 0.083 | -0.375 | 0.343 | -0.434 |
| We waste because we do not have proper information regarding the preparation of the product. | 0.805 | -0.497 | 0.097 | 0.23 | -0.582 | 0.503 | -0.42 |
| We waste because we often prepare food incorrectly. | 0.816 | -0.44 | 0.099 | 0.293 | -0.518 | 0.353 | -0.395 |
| We waste because we often prepare too much. | 0.339 | -0.323 | 0.2 | 0.581 | -0.37 | 0.276 | -0.341 |
| We waste because we often serve food incorrectly. | 0.78 | -0.45 | 0.128 | 0.307 | -0.494 | 0.354 | -0.432 |
| We waste because we are concerned about the health and safety of the product. | 0.259 | -0.303 | 0.468 | 0.153 | -0.23 | 0.352 | -0.412 |
| We waste because the food product appears unappetizing although it might still be edible | 0.387 | -0.352 | 0.362 | 0.359 | -0.393 | 0.374 | -0.549 |
| We waste because the product might seem slimy / moldy | 0.057 | -0.176 | 0.751 | 0.186 | -0.168 | 0.23 | -0.355 |
| We waste because the product might smell bad | 0.13 | -0.239 | 0.738 | 0.146 | -0.231 | 0.223 | -0.437 |
| We waste because the promotional material in the store prompted me to buy in excess | 0.384 | -0.428 | 0.199 | 0.393 | -0.831 | 0.401 | -0.351 |
| We waste because the promotional material in the store prompted me to buy these products even though it was not on my list | 0.443 | -0.445 | 0.215 | 0.358 | -0.847 | 0.366 | -0.381 |
| We waste because I'm easily swayed to buy new or interesting products from this category | 0.536 | -0.415 | 0.126 | 0.324 | -0.743 | 0.374 | -0.406 |
| We waste because we try to abide to new trends, fads or diets concerning these commodities | 0.546 | -0.42 | 0.158 | 0.275 | -0.685 | 0.388 | -0.447 |
| We waste because we do not have the correct information to utilize the commodity. | 0.773 | -0.456 | 0.15 | 0.237 | -0.553 | 0.474 | -0.388 |
| We waste because we do not have the necessary culinary skills to utilize the commodity. | 0.754 | -0.425 | 0.118 | 0.261 | -0.504 | 0.42 | -0.348 |
| We waste because we do not have time to plan a menu that includes these commodities. | 0.407 | -0.361 | 0.203 | 0.542 | -0.443 | 0.328 | -0.263 |
| We waste because the product appeared to be of poor quality. | 0.304 | -0.334 | 0.501 | 0.23 | -0.392 | 0.337 | -0.741 |
| We waste because the product appeared bruised. | 0.298 | -0.361 | 0.405 | 0.28 | -0.374 | 0.326 | -0.782 |
| We waste because the product appeared deformed. | 0.401 | -0.374 | 0.341 | 0.203 | -0.386 | 0.327 | -0.754 |
| We waste because the product appeared blemished. | 0.333 | -0.348 | 0.437 | 0.216 | -0.395 | 0.356 | -0.821 |
| We waste because the product appeared rotten. | 0.024 | -0.187 | 0.673 | 0.178 | -0.126 | 0.211 | -0.499 |
| We waste because the product appeared old. | 0.172 | -0.298 | 0.601 | 0.237 | -0.234 | 0.288 | -0.67 |
| N | 1096 | 1106 | 1094 | 1088 | 1100 | 1091 | 1088 |
| Mean | 1.33 | 1.9 | 2.68 | 2.33 | 1.54 | 1.88 | 2.16 |
| Standard Deviation | 4.892 | 3.52 | 3.421 | 7.009 | 4.292 | 6.221 | 6.342 |
| % Variance Explained | 35.301 | 7.686 | 6.203 | 4.113 | 2.883 | 2.667 | 2.62 |
| Cronbach alpha | 0.903 | 0.94 | 0.763 | 0.866 | 0.864 | 0.846 | 0.866 |
| Eigen Value | 14.474 | 3.151 | 2.543 | 1.686 | 1.182 | 1.094 | 1.074 |

Figure 5.4: Factors representing the dimension of consumers household waste practices

A one-way analysis of variances (ANOVA) was used to seek significant differences across age, education level, income and population group, while a T-test was performed to investigate the possible significant differences between the two gender categories. Please note that the ANOVA was only performed on Factor 2 as this study was primarily concerned with investigating date labelling as a possible reason for wastage. In cases where evidence of significant differences occurred, a post- hoc test was done to specify the differences explicitly (see Figure 5.5).

| | Factor 2 (Date Labelling) | | |
|-----------------------------------|---------------------------|-----------|------------|
| GENDER | n | M* | SEM |
| Male | 354 | 1.85 | 0.06 |
| Female | 720 | 1.93 | 0.04 |
| Total | 1074 | 1.89 | 0.05 |
| p-value | 0.327 | | |
| AGE | n | M* | SEM |
| 21-23 years | 343 | 1.85 | 0.06 |
| 24-30 years | 271 | 1.81 | 0.07 |
| 31-40 years | 149 | 2.08 | 0.10 |
| 41-50 years | 147 | 1.95 | 0.09 |
| 51-60 years | 139 | 1.95 | 0.10 |
| 61+ years | 37 | 2.02 | 0.19 |
| Total | 1086 | 1.90 | 0.04 |
| p-value | 0.271 | | |
| EDUCATION LEVEL | n | M* | SEM |
| Lower than grade 12 | 19 | 2.33 | 0.24 |
| Grade 12 | 344 | 1.90 | 0.06 |
| Grade 12 plus a degree or diploma | 470 | 1.92 | 0.05 |
| Post graduate degree | 268 | 1.83 | 0.07 |
| Total | 1101 | 1.90 | 0.04 |
| p-value | 0.299 | | |
| POPULATION GROUP | n | M* | SEM |
| African | 159 | 2.27 | 0.09 |
| Asian | 2 | 2.83 | 0.17 |
| Coloured | 13 | 1.97 | 0.39 |
| Indian | 12 | 1.89 | 0.33 |
| White | 904 | 1.93 | 0.04 |
| Other | 6 | 1.33 | 0.50 |
| Total | 1096 | 1.90 | 0.04 |
| p-value | 0.152 | | |
| HOUSEHOLD INCOME | n | M* | SEM |
| R0- R10 000 | 224 | 1.94 | 0.08 |
| R10 001- R20 000 | 157 | 1.97 | 0.10 |
| R20 001-R30 000 | 140 | 1.78 | 0.10 |
| R30 001- R40 000 | 144 | 1.96 | 0.09 |
| R40 001-R50 000 | 116 | 1.88 | 0.12 |
| R50 001- R60 000 | 77 | 1.98 | 0.13 |
| R60 001- R70 000 | 52 | 1.71 | 0.16 |
| R70 001-R80 000 | 41 | 1.89 | 0.18 |
| R80 001- R90 000 | 18 | 1.85 | 0.31 |
| R90 001 -R100 000 | 71 | 1.77 | 0.14 |
| Total | 1040 | 1.89 | 0.04 |
| p-value | 0.814 | | |

Figure 5.5: Date labelling as a pertinent reason for wastage across the various demographic categories

M* = Mean maximum of 4; **SEM** = Standard error of the mean; **p – values** indicate significant differences, ($p \leq 0.05$)

5.3.2.2 Factor 2: date labelling

Gender, age, education level, income and population group: No significant differences could be confirmed ($p > 0.05$) amongst the subsets of the data in either of the demographic categories. This means that these demographic characteristics cannot be used to predict fresh produce wastage as a result of date labelling.

5.3.2.3 Specific scale items used in the EFA that warrants further investigation

In terms of the individual scale items that were grouped in Factor 2, the results indicated that the respondents ($n=404$) mostly agreed that the use-by date contributed to the majority of their wastage behaviour. The results are presented in Figure 5.6.

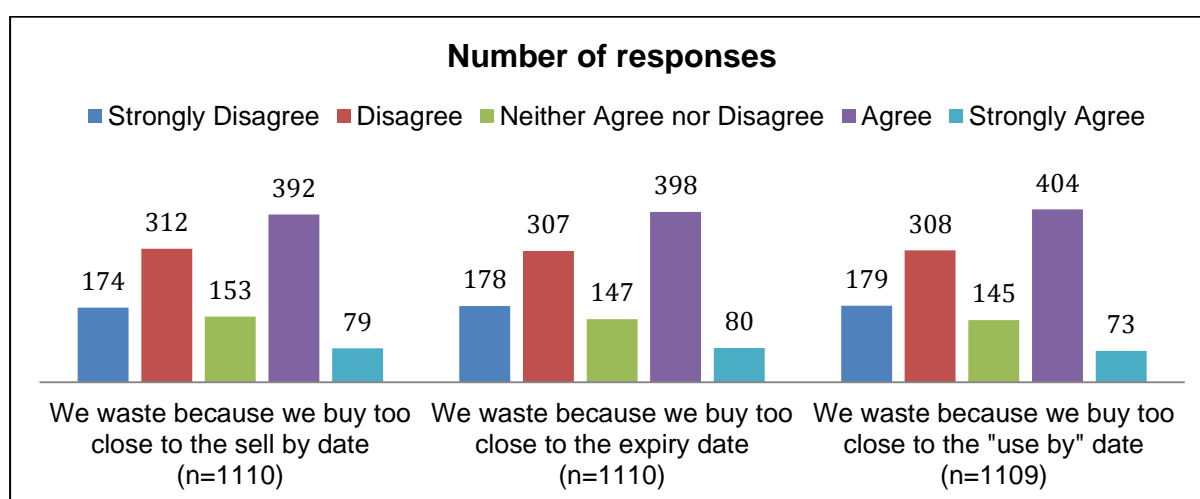


Figure 5.6: Date labelling as a reason for household waste during purchasing

5.3.3 Consumers' knowledge of and consequential misinterpretation of date labelling

The following findings and discussions are organised in accordance with Phase 2 and its particular objectives:

Consumers' subjective knowledge of date labelling (Objective 2.1).

Consumers' objective knowledge of date labelling (Objective 2.2).

Phase 2 set out to explore consumers' general knowledge of date labelling (in terms of subjective and objective dimensions) in order to explain current misinterpretation that could contribute to unnecessary fresh produce wastage. The inclusion of the focus group discussions was specifically chosen not only to support but also to present a more holistic scenario. Due to the fact that this study mainly relied on quantitative reasoning, each focus

group commenced with two short tests that measured the respondents' subjective and objective knowledge quantitatively. Although the sample for this phase only included 12 participants, the findings not only provided deeper insight into and understanding of consumers' knowledge of date labelling, it also highlighted some limitations and future research recommendations.

5.3.3.1 Consumers' subjective knowledge of date labelling

In terms of consumers' understanding and implementation of date labelling, subjective knowledge can be explained as an individual's perception of how much she/he knows about a product category, including brands, attributes, evaluations, decision heuristics and usage situations (Scribner & Weun, 2000).

In order to measure consumers' subjective knowledge of date labelling, the participants were firstly requested to respond to a 5-point Likert type scale that ranged from 1 (strongly disagree) to 5 (strongly agree).

The three subjective knowledge items were self-developed. Figure 5.5 presents the specific scale items and the consequential results.

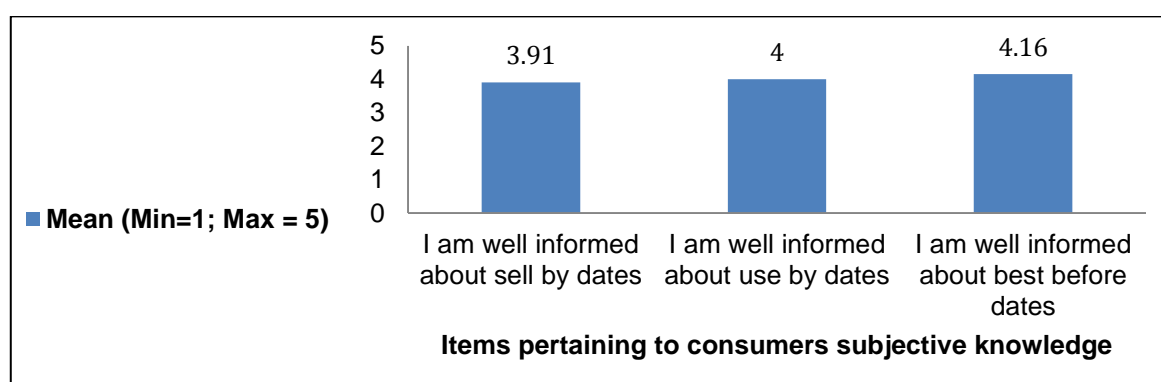


Figure 5.7: Consumers subjective knowledge of date labelling (n=12)

Means greater than 2.5 for the individual scale items were considered as a positive reflection of the respondents' subjective knowledge. Overall, the findings revealed that the respondents were quite confident about their subjective knowledge pertaining to all three the dimensions of date labelling. The respective means revealed that the respondents mostly agreed with the content of scale item 3 (Mean=4.16), thus most of the respondents believed that they were especially well informed about best-before dates.

During the first part of the focus group discussion (which aimed to measure the participants' subjective knowledge), they were prompted to elaborate on how much they knew about date labelling. Three themes emerged, namely:

- The belief that they knew enough;
- Over-confidence; and
- Being unconcerned

The findings confirmed the results presented in Figure 5.5 in that most of the participants **believed that they knew enough** in order to make a responsible consumer decision.

"I feel that I can figure out the meanings of date labelling and are well informed about date labelling - Recently I have actually checked out quite a few websites that shows you...I have been checking out these sites quite a bit" (P5 F1).

"I think it's not that difficult... you kind of figure it out" (P3 F1).

Although the focus group findings indicated that, in general, the participants felt that they knew enough, it did reveal that they were not 100% comfortable when confronted with different types (dimensions) of date coding (i.e. sell-by versus use-by) and often felt somewhat confused.

"I think there is still a huge confusion amongst consumers about what date labelling actually means" (P1 F2).

"Retailers don't use the same system - I'm not sure; is sell by date more for the shop" (P7 F1)

"Like I'm thinking now – is the best-before the best to use by you or is it best for in store selling?" (P4 F2)

"Because... Best-before mean best-before today – that means you should have bought it yesterday and not today because today it should be off. So you don't know if you should use it... the day before that says best-before the 8th July so then you must use it by the 7th only because the 8th is not best-before" (F2 P4).

The second theme that the focus group discussions revealed were that the participants were somewhat **over-confident about their knowledge** of date labelling in that they felt that they often knew more than local retailers.

“Sometimes when you are shopping you see stuff that has expired but it is still there... and I feel that the store is actually being irresponsible ... because they are not removing the stuff that is already off” (P3 F2).

As a final theme, the focus groups also revealed that many of the participants **did not really acknowledge date labelling/showed no interest or concern** but rather relied on their own judgment (i.e. what they think is best).

“And most of the time people don’t really care – like they don’t really look at the use-by date or sell-by date...” (F1 P6).

“Because now the sell-by date has gone... I will check the actual item, if it is bananas, I want to see if the bananas look fresh. I’m not really that interested in the use-by or sell-by date if I can see that the produce looks good” (F2 P3).

“I check that apples aren’t full of bruises and I check that bananas aren’t full of bruises or whatever fruit I am buying... and like my fresh produce I’m buying broccoli or whatever I check to see that it doesn’t have yellow bits on it... that it is already old. So, the sell-by date for that does not really count much for me because I look at the stuff” (F2 P3).

“People on the streets don’t do sell-by dates... they just decant everything, you won’t see the dates, you just see the quality of the product and you just look at it and you judge with your eyes” (F2 P2).

“At my house, I pay attention, but when shopping I might never look” (F1 P4).

In conclusion, although the findings pertaining to the subjective knowledge test indicated that most of the participants believed that their subjective knowledge compared to others was good enough to make responsible decisions, the focus group findings, however, indicated that there is still room for improvement because many consumers tend to be somewhat over-confident, whereas others do not really acknowledge the need for date labelling. Areas of concern that were identified as possible reasons for misinterpretation included confusion about the different dimensions of date labelling, as well as who the intended audience actually is. It is therefore suggested that different ways be explored to educate consumers in this respect.

5.3.3.2 Consumers’ objective knowledge of date labelling

Consumers’ objective knowledge refers to the actual content and organisation of knowledge held in the memory (Brucks, 1986; Mueller *et al.*, 2008). To measure consumers’ objective

knowledge, the participants were asked to respond to a list of 10 items drawn from Gámbaro, Ellis and Prieto (2013); Josling, Roberts and Orden (2004), and Brucks (1985:13), which was adapted to form a true/false scale. This 10-point scale intended to measure consumers' knowledge of date labelling in terms of two pertinent dimensions:

1. Consumers' knowledge regarding terminology.
2. The purpose and application of date labelling.

The results were interpreted as follows: a score < 50% was interpreted as a poor reflection of objective knowledge; 50 > 60%: average; 60 > 70: above average; 70 > 80%: good; 80 > 90%: very good, and $\geq 90\%$ excellent.

A total score for the respondents' objective knowledge was created by adding the number of correct answers from the 10 true or false questions. Thereafter, the mean value was calculated for each answer. A summary of the objective knowledge results is presented in Table 5.2.

Table 5.2: Consumers' objective knowledge of date labelling

| Knowledge | Item | % Correct |
|--------------------------------|--|--------------|
| Excellent: M = >90% | Products that are high in price should only contain date labels. | 100 |
| | A use-by date tells the consumer the last date recommended for safe consumption. | 91.67 |
| | The purpose of a use-by date is to tell the consumer the last date recommended for safe consumption. | 91.67 |
| | Products that are only high in quality and safety should contain date labels. | 91.67 |
| | Products that are refrigerated should also contain date labels. | 91.67 |
| Average: M = 50 > 60% | Best if used by (i.e. best-before) date on fresh produce is used to evaluate if the food is at its highest quality that day. | 58.33 |
| | Use-by date is evaluated by consumers to determine the taste of fresh produce. | 58.33 |
| Poor: M = < 50% | The purpose of a sell-by date is to tell the store how long the date can be extended on the shelf from that date. | 50.00 |
| | A sell-by date tells the store how long the date can be extended on the shelf from that date. | 41.67 |
| | Products that are non-perishable should contain date labels. | 16.667 |
| Above Average: M = 60 > 70% | Total for sample (N=12) | 69.17 |

Overall, the findings in Table 5.2 revealed that the respondents' objective knowledge of date labelling is above average (M = 69.17%), which is comforting to note. In terms of the specific dimensions of date labelling, it seemed that the respondents were better informed about the purpose and application of date labelling (as most of these items, which were marked in green, scored better) compared to items that tested the understanding of specific terminology

(i.e. best-before vs sell-by, which were marked in red). The results pertaining to the respective scale items revealed that the respondents were especially well informed about the application of date labelling, in particular, its application in terms of being a more expensive (M = 100%), high quality, safety risk, and refrigerated produce (M = 91.67). In terms of the terminology used, the results indicated that the respondents were well informed about use-by dates (91.67%), but struggled with the scale items relating to best-before (M = 58.33%) and sell-by dates (41.67%). This corroborates the subjective knowledge findings, which revealed that although consumers are confident that they know how date labelling works, they do, however, experience some confusion in terms of the terminology, which could lead to misinterpretation and ultimately unnecessary wastage.

During the second part of the focus group discussion (which focused on the participants' objective knowledge), the participants were asked to simply reflect on and discuss date labelling. Although the participants were free to explain their views, the facilitator did guide the discussion with some semi-structured questions (see Addendum E).

The findings from the focus group discussion will be presented according to the specific themes that emerged.

Sell-by dates: According to Kosa *et al.* (2007), a sell-by date is a date marked on a perishable product indicating the recommended time by which it should be sold. Sell-by dates are intended to be reviewed by retailers. In terms of the focus group discussion, the findings corroborated the results presented in Table 5.2. Most of the participants seemed informed about sell-by dates, although some confusion was evident in terms of their complete understanding regarding the purpose and/or audience of the labelling. Evidence of this is presented in the following verbatim remarks.

“The product should be out of the shop at that date” (P2 F2).

“The longest it should sit on the shelf at the shop or at the consumer’s house” (P3 F1).

From the above statement, it is evident that the respondents recognise the importance of sell-by dates in retail, but misinterpret it in terms of personal use, which is of concern in terms of waste creation. This confusion also extended to use-by dates.

“[Sell-by dates] ... do they differ from the use-by date?” (P5 F1).

The responses furthermore indicated some confusion or lack of objective knowledge regarding the purpose of sell-by dates.

“[Sell-by dates] ... is simply a recommendation of freshness and food taste” (P5 F1).

“Sell-by date is more for the shop itself as it indicates quality...” (P7 F1).

According to a national survey (GfK, 2009), confusion over date labelling accounts for a substantial part of household food waste in the UK (Consultation, 2014). Another UK study furthermore indicated that 20-25% of households' food wastage was related to interpreting sell-by dates to indicate food safety (William *et al.*, 2012).

Use-by dates: A use-by date tells the consumer the last date recommended for safe consumption (Kosa *et al.*, 2007). The findings from the focus group discussion revealed that the respondents had a clear understanding of use-by dates.

“It tells the last date, acceptable date to use” (P2 F1).

“Recommended date” (P3 F1).

“Best to use it in that recommended date” (P4 F1).

“Date on which it is still the freshest” (P2 F2).

“Should be using that product up until that date” (P3 F2).

Although most of the respondents agreed that the use-by date refers to the last date of consumption as decided by industry, it was good to note that some mentioned that they did not necessarily discard all products once these had reached their sell-by date, but would rather use their own judgment.

“If they say use-by date – you can keep it until beyond that date ... they just try to put themselves in a safe position” (P5 F2).

The participants also commented that the purpose of a use-by date is also for the manufacturer's benefit; whereas the literature also indicates that a use-by date is usually determined by the manufacturer (Kosa *et al.*, 2007).

The results pertaining to use-by dates highlight that there is still much to do in terms of consumer education in order to mitigate consumers' misinterpretation and subsequent wastage. Consumers often do not interpret or evaluate the use-by dates on food correctly and also tend to interpret dates differently depending on the food category (Van Boxtel *et al.*, 2014).

Best-before date: According to the literature, best-before dates are not only applied to frozen, dried and tinned foods, but could also be applied to fresh food products such as fruit

and vegetables. It is important to note that these date codes are about quality, not safety (Kosa *et al.*, 2007). Thus, expired best-before dates do not mean that the food is harmful, however, it might begin to lose certain intrinsic attributes such as flavour and texture. The findings regarding respondents' objective knowledge of best-before dates were interpreted as positive. Most of the participants were eager to share their thoughts:

"It will be the freshest, best quality if it is used by a best-by date" (P5 F1).

"If you use it afterwards it might not be at its best - either nutritionally it will be compromised or freshness will be compromised" (P3 F2).

The respondents at this stage once again mentioned that they did experience some confusion, but in particular with best-before dates as they seldom knew how to interpret the quality versus the safety of the food product correctly.

"I think there is generally confusion amongst consumers?" (P1:F2)

"Yes... HUGELY" (P1 F2).

"Like I'm thinking now – is it best to use for you, or is it the product that is best?" (P4 F2).

The literature indicates that the 'best if used by' date on fresh produce is used to evaluate if the food is at its highest quality that day (Kosa *et al.*, 2007).

The above findings regarding best-before date labelling supports previous research published in the US, which indicated that 71% of consumers misunderstood the term use-by and best-before, whereas only 18% of consumers correctly defined the use-by date (Newsome *et al.*, 2014). The findings from a study conducted by Wrap (2007) also showed that food that had passed the best-before or use-by date was a key reason for throwing away uneaten food.

In conclusion, the findings from the focus group discussion pertaining to the objective knowledge of the participants confirmed the results presented in Table 5.2. It is therefore concluded that although most of the participants were well-informed about the application of date labelling, attention should be given to educating consumers in terms of such terminology. The main area of concern here is consumers' confusion about different date labelling 'dimensions', i.e. sell-by vs. use-by or best-before, as well as the intended audience. Previous research has identified that the variation in date labelling terms and application contributes to substantial misunderstanding related to food quality and safety in the market

place, thus causing confusion among consumers (Newsome *et al.*, 2014). WRAP estimates that up to 20% of household food waste is linked to date labelling confusion (Gunders, 2012).

5.3.4 Possible avenues and mitigating strategies to amend unnecessary fresh produce wastage (objective 3)

In order to gain valuable insight into and ideas about possible mitigation strategies that could be employed to amend current fresh produce wastage, the respondents were asked to complete two open-ended questions. The first question asked the respondents to state possible reasons that hindered more sustainable fresh produce consumption. The second question prompted the respondents to briefly suggest strategies that they saw fit to mitigate unnecessary fresh produce wastage. An analysis of these questions required coding of all the responses, followed by a content analysis and the categorisation of constructs in terms of coherent categories.

5.3.4.1 Hindrances that lead to unnecessary wastage

In terms of the issues that lead to wastage, or that limit more sustainable fresh produce consumption, the responses reflected a strong focus on poor planning and purchasing, as well as packaging and portion sizes. Although date labelling was not mentioned as prominently as the previous issues, it did still feature amongst the top five areas of concern. Table 5.3 presents the top six problem areas or issues as noted by the respondents.

Table 5.3: Consumers' barriers that reflect household wastage (n=814)

| BARRIERS | n | % |
|---|----------|----------|
| Poor planning & purchasing decisions | 277 | 22.34 |
| Packaging and portion size that did not fit household needs | 249 | 20.08 |
| No re-cycling | 99 | 7.98 |
| Date labelling of the product (shelf life) | 75 | 6.04 |
| Insufficient storage | 58 | 4.68 |
| Education | 56 | 4.52 |

The focus group discussions not only supported the findings as presented in Table 5.3, but also highlighted the confusion in terms of date labels, as well as consumers' need for education. The responses indicated that there is a strong need for consumer education not only in terms of understanding and interpreting date labelling, but also how to prolong fresh produce quality in order to waste less.

“The thing about all of this (date labels) is they don’t educate people on what that means...” (F2 P4).

” A guideline is needed on how long it (date labels – produce) is expected to be in the consumers’ hand” (F1 P3) and “recommendations” (F1 P5).

“Websites that shows you, what it (date labels) means...” (F1 P5).

“It is all about how you store it also... is it autumn, is it summer, is it winter and all of those kind of things” (F2 P4).

“My wife and I was discussing this last night; if you buy avos [avocados] and you chop it up and you put it into your bag you can freeze it for 24months and it will still be fresh ... bananas also if you get them and you chop them up, you freeze it for 12 months and you defrost it and you can still use it” (F2 P4).

5.3.4.2 Possible mitigating strategies

The respondents’ ideas in terms of how to mitigate unsustainable fresh produce practices included suggestions regarding consumer education, providing guidelines (i.e. on storage and refrigeration), recommendations, using websites, and using one’s own instinct (i.e. knowledge).

The following discussion presents a summary of possible mitigating strategies or avenues that have been identified and could be implemented to mitigate consumers’ misinterpretation of date labelling.

It is believed that these suggestions might encourage or enable households to address their weekly food waste, and together, it offers the fresh produce industry an opportunity to minimise fresh produce waste, reduce cost, and benefit the environment. According to Blanke (2015), every attempt and idea presented by individuals should be appreciated and viewed as a valued effort to safeguard our natural resources including labour, water and land.

5.3.4.3 Applications (apps)

A possible avenue that could be implemented is “an app that tells you what you could make with the food in your fridge” – this answer was mentioned quite frequently in the open-ended question. Currently, there are smartphone apps already available that can help reduce the amount of food wasted. The apps ‘Consumer Within’ and ‘Fridge Buddy’ were mentioned and were reviewed as applications that are able to track the expiration dates on food. Using the

app can alert users about the foods that are about to expire within the next few days and display these in a user-friendly manner that is easy to understand. This could thus also mitigate consumers' misinterpretation of date labelling, which leads to fresh produce waste practices when dates on food are not interpreted correctly (James, 2013). These applications are available for download from Apple iTunes (Consume Within) and the Windows 10 App Store (Fridge Buddy). Further recommendations included that consumers should be made more aware of the technology or apps that are available to help them save household costs and reduce waste practices. In Figure 5.8, a screenshot is displayed of the Fridge Buddy App (Windows 10 App Store).

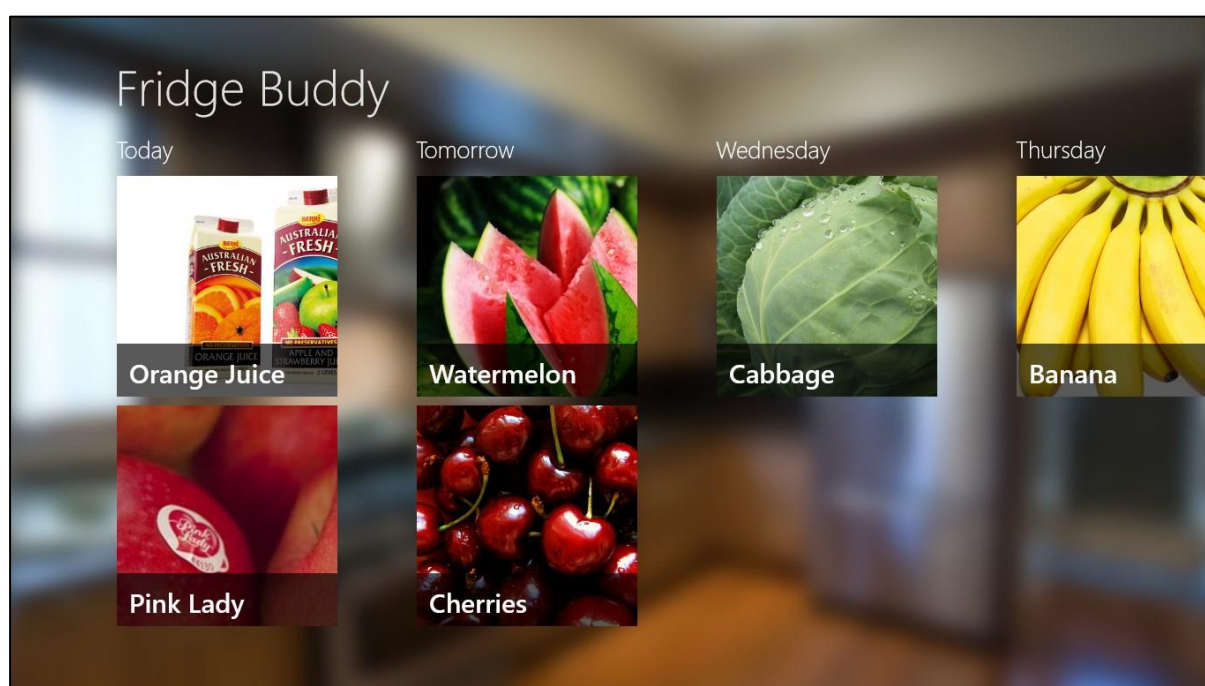


Figure 5.8: Fridge buddy screen shot (Windows 10 app store)

Remove or limit the application of date labelling (especially sell-by dates)

The findings presented in Table 5.3 indicate that one of the top reasons food is wasted is due to the fact that consumers are using date labelling, especially sell-by date information, as a method to discard fresh produce, which leads to premature disposal of fresh produce. Thus, it made sense that when prompted on how to curb wastage, the respondents replied accordingly. The results in terms of the possible mitigating strategies revealed that many respondents agreed that date labelling, especially sell-by dates, lead to unnecessary wastage and that the removal of these might solve the problem. According to the Department for Environment, Food and Rural Affairs (2011), food packaging should only carry either a use-by or best-before date. Sell-by dates are usually used for stock rotation and should be

removed to avoid confusion and misinterpretation on the part of the consumer (DEFRA, 2011, Banke, 2015). The research therefore suggests that sell-by dates in stores should be removed from fresh produce to mitigate consumers' misinterpretation of date labelling and thus reduce household waste.

The respondents also suggested that expiry dates should be "more consistent and visible". Having clear and consistent date labels on food packaging helps consumers make the most of the food they buy, and helps them waste less. Better labelling reduces confusion and misinterpretation, improves food safety, wastes less food, and saves consumers money (Wrap, 2011).

Government support and proper education

Information from government, organisations and retail addressing current food wastage effectively was a prominent suggestion mentioned by the respondents. It is of importance that the Government of South Africa be more supportive in terms of awareness campaigns and educating consumers on food waste and date labelling terminology. The Government, through the Department of Environmental Affairs (DEA), has set up a Green Fund to support the transition to a low carbon, resource efficient and climate resilient development path, delivering high-impact economic, environmental and social benefits. The findings from this research suggest that the DEA should be made aware of the challenges that South Africans are facing regarding misinterpretation of date labelling that thus lead to unnecessary fresh produce waste. Furthermore, the DEA has appointed the Development Bank of Southern Africa (DBSA) as the implementing agent of the Green Fund. Further research and funds could therefore be supported by the Green Fund to help educate consumers on date labelling. In other countries, such as Europe, European Parliament has asked the European commissions and member states to clarify the meaning of date labels in order to reduce consumer uncertainty about the edibility of food, and improve the accuracy of information offered to the public. It also called on the Commission to issue recommendations regarding refrigeration temperatures, as well as to assess and encourage measures aimed at reducing food waste upstream, such as dual-date labelling and the discounted sale of foods close to their expiry date or of damaged goods (EPRS, 2015).

Education, per se, was not only emphasised, but the respondents had specific ideas and requirements in terms of educational needs and content. Education regarding composting at home, knowing more about food waste, and highlighting how waste contributes to bigger problems were mentioned.

Education was identified as a key component given the percentages of consumers who do not understand the differences in date labelling (i.e. use-by date, sell-by date and best-before date) and the extent of food waste occurring within households (Newsome *et al.*, 2014). The Committee on World Food Security also recently called upon all nations to support efforts for coherence, clarification and harmonisation of the meaning and use of food date labelling at national as well as international level (EPRS, 2015). While consumers' knowledge of labelling is limited in terms of understanding the labelling scheme; education campaigns can be designed to inform consumers about the meaning of 'use-by', 'sell-by' and 'best if used by' dates to ensure that South African consumers are best able to understand date labelling (EPRS, 2015). Ultimately, sensible date label reform will reduce consumers' confusion and thus also reduce fresh produce waste practices in households, and simplify regulatory compliance. According to Newsome *et al.* (2014:765), "Improved understanding of a streamlined, uniform food date labelling scheme will also improve purchasing decisions by the consumer," and "ideally, existing literature and research studies would be used as reference points and further research would be conducted to determine the date labelling language and format that consumers would prefer."

Awareness campaigns

Possible education campaigns, such as the 'Love Food Hate Waste' UK government campaign, which has proven to be very successful in reducing food waste overall among UK consumers, could be initiated in South Africa to make consumers aware of the problem at hand (Newsome *et al.*, 2014).

The respondents identified awareness campaigns as one of the suggestions to help mitigate fresh produce waste practices and even mentioned that, "Just being aware of how much food I do waste (from doing the survey) makes me more aware of my food waste." Waste is made invisible to consumers by the bin and thus there is also a lack of awareness of the amount of waste generated in households (De Coverly, McDonagh, O'Malley & Patterson, 2008). Since individuals generally throw out only small amounts of food at a time, and it is soon collected and hauled away, it is almost impossible for one to acknowledge and appreciate the aggregate amount of waste that one generates (De Coverly *et al.*, 2008).

5.4 SUMMARY

The results were gathered by implementing both quantitative and qualitative data collection techniques, this implied an exploratory sequential mixed methods design. The results were

presented according to the objectives of the study obtained during each phase. The research focused on consumers' fresh produce household waste practices, date labelling as a pertinent reason for fresh produce wastage, consumers' subjective and objective knowledge of date labelling, as well as possible avenues and suggestions that could be implemented to mitigate consumers' misinterpretation of date labelling, and thus curb fresh produce waste.

The research sample consisted of 1767 participants in total who were recruited across Gauteng for the research focus during Phase 1. The majority of the sample was female (62%, n=1096) which was not considered a problem as in SA the main decision makers regarding household groceries are still mostly women. The findings during Phase 1 (quantitative data) revealed fresh produce (41.24%) as the largest waste category in households, with fruit contributing 20.14% to waste and vegetables contributing 21.1% to waste.

Date labelling is usually used as a source of information about the product. This is where consumers' knowledge has an important role regarding information searching and processing (Williams *et al.*, 2012). During Phase 1 (qualitative data) from the EFA results, date labelling was identified as one of the top contributors to household food waste practices. Date labelling was further analysed and subjected to an ANOVA and T-test across the various demographic categories, and no significant differences were found.

During Phase 2 (qualitative results), consumers' objective and subjective knowledge on date labelling was measured during a focus group discussion (including a subjective and objective knowledge test at the start of each focus group). When consumers search for information, they use two types of distinct knowledge, namely, objective and subjective knowledge. Objective knowledge is the actual amount of accurate information stored in the memory, whereas subjective knowledge refers to a person's perception of the amount of information they have (Brucks, 1985; Flynn & Goldsmith, 1999; Park *et al.*, 1994). Consumers' subjective and objective knowledge was measured by calculating the correct answers in percentage (%) and mean values, and furthermore also discussing the focus group meeting, describing and analysing the respondents' answers.

The majority of the respondents were quite confident about their subjective knowledge and were well-informed about best-before dates (Mean = 4.16; $M_{\text{Maximum}} = 5$), however, there is still room for improvement. On the one hand, the respondents' objective knowledge indicated that they had above average knowledge (69.17%) of date labelling. The areas of concern identified included consumers' confusion in terms of date labelling. On the other hand, the findings also show that there is a lack of subjective and objective knowledge related to date

labelling in terms of actual application. These findings are supported by Gunders (2012), who found that multiple dates, inconsistent usage, and lack of education around date labels cause consumers to discard food unnecessarily. A recent study in the UK indicated that 20-25% of household food waste was due to consumers interpreting date labelling information incorrectly. Research that was published in the US indicates that 71% of consumers misunderstand the terms 'use-by' and 'best-before' (Newsome *et al.*, 2014; Van Boxtael *et al.*, 2014; Williams *et al.*, 2012).

In order to gain valuable insight, the research furthermore also explored possible suggestions or mitigating strategies to amend fresh produce wastage. The respondents were asked to propose suggestions on how fresh produce waste practices could be mitigated. The findings revealed that poor planning and purchasing (n=277 / 22.30%) were identified as the main causes of fresh produce wastage in households. Although date labelling was not identified as one of the top three reasons, it did still feature amongst the top five, thus confirming the proposal that consumers' knowledge of date labelling does contribute to household waste practices in Gauteng.

Possible avenues identified that could be implemented to mitigate consumers' misinterpretation of date labelling included making use of an app that alerts users to use their produce before it goes off; removing sell-by dates; and extra support from the South African government through education and awareness campaigns. These research findings could contribute to the research focus of the Department of Consumer Science at the University of Pretoria, and could assist in addressing the need in food waste management identified by the CSIR.

CHAPTER 6 CONCLUSION OF THE STUDY

This chapter presents the conclusion of the research in terms of the objectives of the study.

The shortcomings of the study are discussed and recommendations are made for future research. Research procedures are also reviewed in terms of technical and ethical issues.

6.1 INTRODUCTION

Consumers today tend to easily discard food that no longer meets their needs or quality preferences. This is currently a contentious issue in lieu of hot-topics such as sustainability. In South Africa, 10.2 million tonnes of food are wasted per year with fresh produce contributing the largest amount of waste (Nahman & de Lange, 2013). One of the reasons noted is that consumers often discard food prematurely because they misinterpret date labelling (WRAP, 2011). The problem is further exacerbated as current retail procedures and policies determining date labelling on food products, such as fresh produce, are seldom regulated. This therefore incites unnecessary wastage. Mitigation is therefore a non-negotiable topic, not only at household level, but at all stages in the supply chain.

The study therefore aimed to provide empirical evidence of consumers' current fresh produce wastage practices in order to determine date labelling as a pertinent reason for unnecessary wastage. The study also aimed to explore consumers' understanding and interpretation of date labelling in terms of knowledge dimensions (subjective and objective) to not only describe consumers' fresh produce wastage practices, but also to propose mitigating strategies.

A mixed methods approach was implemented to collect the data. During the first phase of data collection, a structured questionnaire was used to collect quantifiable data from 1767 respondents in Gauteng, South Africa. In the second phase, data were collected during two focus group discussions, which included a subjective and objective knowledge test.

The data from the structured questionnaire were automatically captured and coded electronically by means of the Qualtrix software. Quantitative data were analysed and presented in terms of descriptive and inferential statistics. The focus group discussions were firstly transcribed, where after relevant themes were identified by means of conceptual analysis.

The Systems Theory was found appropriate, and was therefore used to guide discussions as it enabled a study and understanding of the sequence, relationship and interdependency of fundamental elements that influence fresh produce wastage. The Systems Theory proposes three primary constructs, which were explored in the research, namely: (1) Input that represents consumers' household wastage practices, (2) A transformation phase that involves consumers' interpretation of date labelling in terms of their knowledge dimensions (i.e. subjective and objective), and (3) Output that identifies possible strategies that could be implemented to mitigate consumers' misinterpretation of date labelling and thus curb unnecessary fresh produce wastage (feedback into the system).

The following conclusions are presented in accordance with the main objectives of this study. The applicable constructs that were drawn from the Systems Theory will also be highlighted.

6.2 CONCLUSION OF THE OBJECTIVES

6.2.1 Analysis of consumers' current fresh produce wastage practices in order to identify date labelling as a pertinent reason for unnecessary fresh produce waste (objective 1)

At present, research regarding food wastage in terms of households has received little attention, which is somewhat concerning as this is not just detrimental to our natural, economic and social environment, but also in terms of alleviating hunger. This research therefore explored consumers' current wastage practices. The findings confirmed that household wastage (*input*) is a concerning matter, and indicated fresh produce, particularly vegetables (21.1%; M = 4.39) and fruit (20.14%; M = 4.61), as the commodities wasted the most during a four-week period. In terms of demographics, the results revealed that women, albeit working, are still fulfilling the traditional role of primary food and grocery shopper in most households. This was interesting when interpreting the findings from the EFA, which revealed that most respondents agreed that health and safety (M=2.68) was the main reason for discarding fresh produce, followed by planning and purchasing (M=2.33), appearance (M=2.16) and date labelling (M = 1.90). From this, one could deduce that due to the nurturing nature of women and their concern about their family's well-fare, fresh produce is often prematurely wasted.

6.2.2 Analysis of consumers' general knowledge of date labelling in terms of subjective and objective knowledge dimensions in order to explain current misinterpretation of date labelling that contribute to unnecessary fresh produce waste practices (objective 2)

The study distinguished between different types of knowledge in terms of respondents' subjective and objective knowledge dimensions about date labelling and its relevance in terms of fresh produce wastage practices. According to Alba and Hutchinson (2000), the level of correspondence between objective and subjective knowledge is usually not high. However, a meta-analysis done by Carlson, Vincent, Hardesty and Bearden (2009) reported quite a diverse result regarding the relationship between subjective and objective knowledge constructs.

The findings presented in Chapter 5 revealed that in terms of this study, the respondents' subjective knowledge outweighed their actual objective knowledge. This imbalance confirmed that consumers often misinterpret date labels and that this misinterpretation may induce unsustainable fresh produce consumption/wastage practices. It is therefore crucial to not underestimate the influence of consumers' knowledge in terms of their buying, consumption, and ultimately, their wastage practices.

Although the initial results regarding the respondents' subjective knowledge indicated that consumers tend to be somewhat overly confident, most of the respondents did agree that they experienced some confusion and were open to being educated in terms of date labelling in order to amend their current wastage practices. This supports Sunblat's (2008) notion that the more informed consumers are about date labelling, the more willingly they would be to take action to correct their wastage/bad consumption practices (**transformation**).

This research thus confirms that there is much room for improvement regarding consumers' knowledge of date labelling. Knowledge is seen as an important tool to help avoid unnecessary food wastage, and as such, it affects consumers' ability to use and interpret the date on labels (Graham-Rowe & Sparks, 2014). While knowledge of labelling seems to be better in some countries, it seems that consumers in South Africa have difficulties in understanding and/or interpreting date labelling, which encourages potentially wasteful behaviour as food is needlessly discarded (EPRS, 2015; Knowler, 2016). It is sadly noted that although South Africa's food labelling regulations emphasise that in retail a distinction should be made between the 'use-by', 'best if used by' and 'best-before' dates, this specific practice only confuses consumers, which leads to unnecessary wastage (Knowler, 2016). It is

therefore concluded that South African consumers receive proper knowledge regarding the interpretation of date labelling to mitigate potential wasteful behaviour.

6.2.3 Possible avenues that could be implemented to mitigate consumers' misinterpretation of date labelling and thus curb unnecessary fresh produce wastage (objective 3)

This research set out to identify consumers' misinterpretation and confusion of date labelling and its contribution to household fresh produce wastage practices as a concern or contentious issue **(Input)** (Objective 1). Objective 2 confirmed that respondents are often confused when interpreting date labels, and proposed that through proper education and knowledge transfer, the mitigation of current wastage practices is possible **(Transformation)**. In terms of possible avenues that could be implemented to mitigate consumers' misinterpretation of date labelling and thus curb unnecessary fresh produce wastage **(output)**, this study proposes using smartphone apps that could be used to track expiration dates on food that will enable the consumer to plan and purchase fresh produce more sustainably. It is also proposed that retail should invest in revising current date labelling strategies and, in future, consider implementing a strategy that is applicable across all retailers in SA (i.e. more consistent date labelling), as well as considering the removal of sell-by dates, which is one of the main labels causing confusion.

The respondents also mentioned a strong need for proper education pertaining to date labelling. Education in particular has been identified as a key component to mitigate fresh produce wastage as a result of date labelling misinterpretation. This study recommends the education of consumers through awareness campaigns, which could be supported by the Department of Environmental Affairs (DEA) and the Green Fund. It is therefore important that the government must be aware of the current problem at hand to be able to address this problem sufficiently.

However, much still needs to be done to encourage, educate and convince South African consumers to take household food wastage matters more seriously. Not all consumers are aware of the negative consequences of food wastage and the amount of food they throw away. It is furthermore imperative that avenues such as those mentioned and identified in this study be presented to the relevant parties (government and retail) in order to continue discussions **(Feed-back)**, which could lead to introducing and educating consumers in a more engaging manner.

6.3 THE RESEARCH IN RETROSPECT

It is always important that a researcher evaluates the research objectively at the end of the investigation to reflect on the reliability of the study, the relevance of the methodology and whether all the objectives of the study have been addressed satisfactorily.

Currently, topics of great interest worldwide include household wastage, sustainability and date labelling. In the South African context, limited research has addressed the issue of consumers' misinterpretation of date labelling and fresh produce household wastage practices to date. This research therefore not only investigated the relevant literature, but also called on expert views from prominent institutions that are concerned with food wastage and sustainability to provide sufficient credence to this study. This not only provided the tone of the problem statement, but also assisted in the formulation of the research objectives, conceptual framework, as well as the choice of research instrument.

In Chapter 3 (the methodology), the measures that were taken to ensure reliability and validity were discussed. The reliability of the study was further enhanced by structuring the research in terms of a theoretical perspective (the Systems Theory) right from the planning stages of the study. Different methods of data collection (questionnaires and focus group discussions) were used that complemented each other and consequently served as cross validation to ensure the reliability and trustworthiness of the study (Mouton, 1996:156). Reliability was further emphasised by using a cover letter that accentuated the purpose of the study, the researcher's association with the University of Pretoria, and the guarantee that the information would be treated as confidential. The respondents were recruited by means of a convenience sampling technique. It is believed that because the participants who participated did so voluntarily, this also increases the reliability of the responses. Due to the fact that the questionnaires were delivered via electronic questionnaire and therefore could be completed by the respondents in their own time, it was assumed that the participants would feel less rushed and would be more at ease.

Achievement of the objectives set out for this research

The researcher is confident that all the objectives were attended to and addressed satisfactorily. It was possible to make relevant conclusions based on the data that were generated in terms of all the objectives that were set. Moreover, the questionnaire did not produce any unexpected problems along the way.

It is believed that the findings presented in this study add to the body of literature pertaining to fresh produce wastage (within an emerging economy), but more importantly, it adds to the role and influence of consumers' knowledge in terms of date labelling. The research aimed to broaden the understanding of consumers' subjective and objective knowledge of date labelling and how this possibly contributes to current fresh produce wastage practices. Finally, the study aimed to propose mitigating strategies that could be implemented to curb unnecessary wastage.

6.4 LIMITATIONS OF THE STUDY

Throughout the study, the researcher ensured that the study obtained accurate data in a reliable and ethical fashion. Although it was attempted to conduct the study in the best possible manner, the project was still restricted by certain limitations.

The researcher was employed full-time during the course of this research project, which exerted pressure in terms of the time required to complete the research.

A precondition for inclusion in the study was that the respondents had to be 21 years and older and involved or responsible for food purchasing, preparation and waste management in their homes. During the focus group discussions, the participants mentioned that because they were their households' primary grocery shopper, they felt that they were more aware of the problem relating to household food wastage. It is therefore suggested that future studies also include household members without this precondition so that awareness of food wastage could be investigated from a different perspective and thus a wider audience could be reached in terms of the topic at hand.

Convenience sampling was used to collect the data based on ease of accessibility, the problem though was that convenient sample is not necessarily representative of the population that it is drawn from (Areni, 2003; Salkind, 2008). Because the population in South Africa is very cosmopolitan and complex, a correlation of this kind would have required a much larger sample, which was financially and logistically not available.

In the quantitative phase, only the relevant sections of the questionnaire were identified and used for this study in order to ensure that the data were relevant because the structured questionnaire formed part of a more extensive investigation (titled "Food wastage, sustainability and the triple bottom line – A case study of urban households in Gauteng, South Africa").

In the qualitative phase, only two focus group discussions were held due to time constraints. Limitations pertaining to focus group discussions, as described by Creswell (2014:191), could include indirect information filtered through the views of the interviewers, meetings being held at a designated place rather than a neutral field setting, the researcher's presence creating biased responses, and not all people being equally articulate. None of these limitations were evident in this study, and no other complications were experienced during the data collection procedure. The researcher was able to interpret the findings with minimal difficulty and did not encounter any anomalies in the responses.

6.5 RECOMMENDATIONS FOR FURTHER RESEARCH

It is recommended that consumers' knowledge dimensions (objective and subjective) be further investigated in future research and applied in a variety of research fields, such as clothing, hospitality, sustainability, psychology, marketing and retail industry.

Because this research only used relevant sections from the primary questionnaire, future research could make use of the other sections relating to food wastage results.

Further research could attempt to explore date labelling regulations and guidelines in the South African context to be able to propose a standardised guideline for manufacturers and retailers when determining the dates on food labels (specifically fresh produce). The suggestions could be used to implement new regulatory requirements for date labelling.

It is recommended that a waste management policy regarding the issue of date labelling and fresh produce is compiled. The policy could be used in various industries for both retailers and government regarding the need for informing and educating consumers.

Suggestions can be given to consumers on how to determine (using their judgment and the knowledge available) if fresh produce is still safe for consumption or not, which could mitigate future wastage. These suggestions could be explored and investigated in future research that could aid consumer education and knowledge dimensions on the safe consumption of fresh produce, for example, when a banana turns brown on the outside it looks unappealing to the consumer – however, it is still safe for consumption. So, instead of discarding the product prematurely, it could still be consumed.

Although previous research done in South Africa has provided figures on the amount/quantity of wastage (10.2 million tonnes per year), further research can be done to provide evidence of the amount of food that is prematurely discarded or wasted linked to date labelling

interpretation or food that has gone past its expiration date. Furthermore, it is also recommended that the cost of food that is discarded be calculated in order to educate consumers on the amount of money that they waste by discarding food that is still safe for consumption. It is estimated in the UK that up to 20% of household food waste is linked to date labelling confusion (WRAP, 2011). Moreover, further research on waste management practices needs to be addressed at every stage in the supply chain to address the issue of food wastage across all food categories in South Africa as recent studies also emphasise the notable lack of information regarding waste management in households.

While the problem at hand pertaining to household fresh produce wastage practices is explored in this research, it is recommended that future research could also be done to look at South Africa's food security and how to assist those in need, instead of curbing food that will go to waste unnecessarily.

6.6 IMPLICATIONS OF THE FINDINGS

6.6.1 Implications for the consumer

As the market in South Africa becomes more complex in terms of the resources available, and sustainability, it becomes essential that consumers are educated in terms of their household wastage practices and the usage and interpretation of date labelling. Although consumers are eager to review the information available, they often do not have the proper baseline knowledge available to interpret and apply the information appropriately. It is therefore important to identify the importance of the role that consumers' knowledge has during purchasing, consumption, and ultimately, wastage (Park *et al.*, 1994). If consumers are not properly educated and do not possess the necessary knowledge regarding the implication of their household wastage practices and date labelling usage and interpretation, they will not be able to make informed decisions concerning fresh produce consumption, and will not be able to contribute to sustainable practices that could mitigate unnecessary wastage. It is rather difficult to educate consumers if they think they know something, as was found in this study.

6.6.2 Implication for retailers

According to the Department of Environmental Affairs (DEA, 2010), it is important to encourage a focus on factors such as food retailers, who determine the public's discipline and desire regarding the commitment to more sustainable practices. Amending retail practices pertaining to date labelling such as extending the shelf life of products and

educating consumers could contribute to sustainable wastage practices. If retailers do not acknowledge their importance and commit to employing sustainable practices within retail such as discarding food prematurely and not educating consumers on date labelling information – unsustainable wastage practices will not be mitigated. Furthermore, it should also be noted that retailers that do discard food prematurely should be encouraged to contribute to food security, especially in South Africa.

Retailers should clearly identify the dates on labels so that consumers can easily interpret the information. If consumers struggle to read or interpret the dates on labels, they may easily get confused or misinterpret the label information provided to them, which can lead to unnecessary wastage practices. Recent research on date labelling in the UK also suggests that date labelling information be standardised by retailers/manufacturers to clarify the meaning for the public in order to reduce confusion and misinterpretation during purchasing, consumption and disposal (WRAP, 2011).

6.6.3 Implications for government

It is of the utmost importance that the South African Government be made aware of the current food wastage issue at hand in order to improve current sustainability practices and address food security. If the problem at hand is not communicated to government, mitigating strategies such as awareness campaigns, date labelling practices and policies, and the education of consumers will be difficult to implement. The problem is further exacerbated as consumers are confident in the governments' protective regulations and unfortunately do not always trust South African manufacturers' date labelling information, thus keeping the responsibility for mitigating strategies on the government's shoulders (Fotopoulos & Krystallis, 2003; Council, 2013 & Prinsloo *et al.*, 2012). If food waste is not reduced, it will have a negative impact on our environmental and economic resources (Lipinski *et al.*, 2013). This will result in further implications as the future growth of South Africa is highly dependent on natural resources, which should be conserved (DEAT, 1999).

6.7 CONCLUDING REMARKS

During a recent South African television programme (Carte-Blanche), many consumers across South Africa were made aware of the debilitating effect of waste. Unfortunately, it seems that although many consumers are eager to amend their current wastage practices, very few really know how. This research stipulated that date labelling should not solely be viewed as one of the main problem areas contributing to waste, but should rather be reviewed as a great opportunity in terms of consumer activation. It is believed that through

assistance from the government and retail, consumers could be educated regarding the proper interpretation of date labelling, which could not only empower them, but could also start a positive wave in terms of the mitigation of food waste.

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ADDENDUM A:

REGULATORY FRAMEWORK FOR FOOD DATE LABELLING (Newsome *et al.*, 2014:748-749).

Table 1—Examples of different regulatory frameworks for food date labeling.

| Country | Framework | Focus | Additional information |
|------------------------|--|---|---|
| Australia, New Zealand | Australia New Zealand Food Standards Code – Standard 1.2.5 – Date Marking of Packaged Food – F2012C00762 (Australian Government 2012a) | Use by date on foods that should be consumed before a certain date because of health or safety reasons or best before date for most packaged foods for retail sale or catering purposes; Any specific storage conditions required to ensure that the food will keep for the period indicated by the use by or best before date must be included on the label; Sale after required use by date prohibited | Best before date signifies end of period which the intact package of food, if stored according to any stated storage conditions, will be fully marketable and retain any specific expressed or implied qualities; Use by date signifies end of the estimated period, if stored according to any stated storage conditions, after which the intact package of food should not be consumed because of health or safety reasons. Requirements do not preclude the label on a package of food from including a packed on date or a manufacturer's or packer's code in addition to the required use by or best before date Bread with a shelf life of <7 d may include instead of a best before date a baked on or baked for date |
| | Australia New Zealand Food Standards Code – Standard 2.9.1 – Standard for Infant Formula Products | Storage instructions for period after package opening | |
| | Australia New Zealand Food Standards Code – Standard 2.9.4 – Formulated Supplementary Sports Foods | Statement of recommended consumption in 1 d | |
| | Australia New Zealand Food Standards Code – Standard 2.9.5 – Food for Special Medical Purposes | Expiry date or similar words is permitted instead of use by date on foods required to include a use by date | |
| Canada | Food and Drug Regulations C.R.C., c. 870 | Durable life date with the terms best before and meilleur avant on prepackaged foods with a durable life of ≤90 d that are packaged at other than retail, unless an explanation of the significance of the durable life date appears elsewhere on the label; Packaging date with the terms packaged on and empaqueté le and the durable life on prepackaged foods with a durable life of ≤90 d that are packaged at retail, except when the durable life appears on a poster next to the food; with exceptions; Storage conditions if different from normal room temperature; Expiration date on formulated liquid diets, food represented for use in a very low-energy diet, meal replacements, nutritional supplements, and human milk substitutes | Durable life is the date on which the durable life of a prepackaged product ends; Packaging date is the date on which a food is placed for the first time in a package in which it will be offered for sale to a consumer or the date on which a prepackaged product is weighted by a retailer in a package in which it will be offered for sale for the first time to a consumer; Expiration date, regarding a formulated liquid diet, a food represented for use in a very low-energy diet, a meal replacement or a nutritional supplement, is the date after which the manufacturer does not recommend that it be consumed, and up to which it maintains its microbiological and physical stability and the nutrient content declared on the label |
| European Union (EU) | E.U. Regulation No. 1169/2011 of the European Parliament and the Council of the EU, and EC Regulation No. 178/2002 | Date of minimum durability, preceded by best before, when the date indicates the day, or best before end, accompanied by the date or reference to location of date on the label; or a use by date, with some exceptions; Use by date for microbiologically highly perishable foods likely to be an immediate health danger after a short time period; Any special food storage conditions and/or conditions of use; Date of freezing or date of first freezing for frozen meat, frozen meat preparations, and frozen unprocessed fishery products, preceded by the words frozen on accompanied by the date or a reference to location of date on the label | |
| United States | 21 U.S.C. § 350a and 21 CFR 107.20(c) | Use by date required for infant formula; Storage conditions required for before and after opening | |
| | 21 CFR 113.60(c) | Code identifying packing establishment, product, year and day packed, and period during which packed, on each thermally processed low-acid food packaged in a hermetically-sealed container | |

(Continued)

| Table 1–Continued | | | |
|-------------------|--|--|--|
| Country | Framework | Focus | Additional information |
| | 9 CFR 381.126(a) and (b) | Pack date in either closed or open format required on poultry products, relates to quality; sell by or use by date permitted in lieu of pack date; Lot number (indicating slaughter date) or a coded number required on dressed poultry Pack date, in a 3-digit code, required on egg cartons with USDA grade shield; if a sell by date is used, the code may not exceed 45 d from the pack date | |
| | 2011 'Grade A' Pasteurized Milk Ordinance | Code or lot number on condensed or dry milk products, identifying contents, container quantity, and specific date, run, or product batch; "Keep refrigerated after opening" required on aseptically processed and packaged milk and milk products and condensed or dry milk products | |
| | Uniform Open Dating Regulation, Natl. Conference on Weights and Measures (2-option model for states and local jurisdictions to adopt) | (1) Mandatory uniform date labeling of prepackaged, perishable foods or (2) Optional uniform date labeling of non-perishable foods, with exceptions | For perishable food, the sell by date is based on allowance of a reasonable period after sale for consumption of the food without physical spoilage, loss of value, or loss of palatability; For semi-perishable and long-shelf-life food, sell by or best if used by dates relate to quality, characteristics, formulation, processing impact, packaging or container and protective wrapping or coating, customary transportation, and storage and display conditions |
| | 2013 U.S. FDA Food Code (Voluntary model for states and local jurisdictions to adopt for managerial control at retail and in food service) | Date or day by which the food shall be consumed on the premises, sold, or discarded, being prepared on premises and held at $\leq 41^{\circ}\text{F}$ (5°C) for $> 24\text{ h}$ and $\leq 7\text{ d}$; Date or day, which shall not exceed the manufacturer's use by date, if safety-based, by which the food shall be consumed on the premises, sold, or discarded, being held at $\leq 41^{\circ}\text{F}$ (5°C) for $> 24\text{ h}$ and $\leq 7\text{ d}$ upon opening original container of food that is commercially processed, except for deli salads, certain hard and semi-soft cheeses, cultured dairy products, preserved fish products, shelf stable dry fermented sausages, and shelf stable salt-cured products Retained date marking of earliest-prepared or 1st-prepared ingredient for refrigerated ready-to-eat (RTE) time/temperature control for food safety food ingredient or portion of a refrigerated RTE time/temperature control for safety food subsequently combined with additional ingredients or portions of food Limit refrigerated shelf life to $\leq 30\text{ d}$ of packaging, except for time maintained frozen, or the original manufacturer's sell by or use by date if earlier, and implement HACCP plan in conjunction with packaging time/temperature control for safety food using reduced oxygen packaging, unless a variance exists Sell by or best if used by date on $< 1.89\text{ L}$ ($1/2$ gallon)-capacity packages of received raw shucked shellfish and date shucked on $\geq 1.89\text{ L}$ ($1/2$ gallon)-capacity packages | |

ADDENDUM B:

QUESTIONNAIRE: QUALTRIX ONLINE SURVEY

Q1 Food wastage, sustainability and the triple bottom line - A case study of urban households in Gauteng, South Africa Informed Consent Form Dear respondent. The purpose of this study is to gain insight into the on-going problem of food wastage in South Africa. The study is particularly interested in both consumers' and retailers' current food consumption and waste management practices. Through this research project we would like to identify problem areas and to subsequently provide guidelines so that both retailers and consumers would know how they could become involved in supporting this worthy cause. Thank you for taking the time to share your perspectives and views in this regard. Participants in this study will be asked to answer a number of questions regarding their own food consumption and waste management practices and policies. All answers will be recorded for further use by the investigators only. Respondents are welcome to refrain from answering any questions that they view to be the cause of any discomfort or infringement of their privacy. Refusal to participate or withdrawal of consent, or discontinued participation in the study will not result in any penalty. Please note that your participation is voluntary and does in no way release the researchers or involved institutions from their legal and professional responsibilities. All information will be treated as highly confidential and the identity of respondents need not to be disclosed and will remain anonymous. The results of this study will be presented in aggregated format. Your decision to respond to the questions posed will be interpreted as confirmation that you have agreed to participate.

Q2 Should you wish to partake in future research projects such as focus group discussions pertaining to this study, please provide your email address and mobile phone number in the spaces provided. Please provide your e-mail address in the space below:

Q3 Please provide your mobile phone number in the space below: Please do not enter the country code or any spaces or brackets.

Q4 Please select the person that contacted you to complete the questionnaire

- ☐ Maike Böhmer (1)
- ☐ Meinhardt Breytenbach (2)
- ☐ Caitlin Buckley (3)
- ☐ Ana Bupo (4)
- ☐ Shandré Candiotes (5)
- ☐ Davidzo Chipfunde (6)
- ☐ Hanneltjie Du Toit (7)
- ☐ Rachelle Erasmus (8)
- ☐ Elize Greyling (9)
- ☐ Danelle Human (10)
- ☐ Natalie Jackson (11)
- ☐ Jana Jaquire (12)
- ☐ Tawonga Kalua (13)
- ☐ Kassidy Lombard (14)
- ☐ Nicole Lonsdale (15)
- ☐ Carla Lopes (16)
- ☐ Lizanne Malan (17)
- ☐ Charné Marais (18)
- ☐ Reneé Myburg (19)
- ☐ Fikile Nokwe (20)
- ☐ Kalan Semple (21)
- ☐ Mia Swiegers (22)
- ☐ Lodemé Taljaard (23)
- ☐ Mirel Tatomir (24)
- ☐ Lizette Tlhako (25)
- ☐ Daniëlle van Ghent (26)
- ☐ Ethelie van Heerden (27)
- ☐ Leatitia Viljoen (28)
- ☐ Other (29)

Q5 What is your gender?

- ☐ Male (1)
- ☐ Female (2)

Q6 What was your age at your most recent birthday?

_____ Age (1)

Q7 What is your highest level of education?

- ☐ Lower than grade 12 (1)
- ☐ Grade 12 (2)
- ☐ Grade 12 plus a degree or diploma (3)
- ☐ Post graduate degree (4)

Q8 Please indicate your area of residence within Gauteng (please be specific regarding the City and suburb e.g. Pretoria, Garsfontein)

Q9 Please indicate your specific area of residence on the following map of Gauteng

| | Dislike (1) | Neutral (2) | Like (3) |
|------------------------|-------------|-------------|----------|
| Buffelsdrift (4) | | | |
| Rust De Winter (5) | | | |
| Hammanskraal (6) | | | |
| Roodeplaat (7) | | | |
| De Wagensdrift (8) | | | |
| Boekenhoutskloof (9) | | | |
| Leeuwkloof Valley (10) | | | |
| Rayton (12) | | | |
| Cullinan (13) | | | |
| Bronkhorstspuit (14) | | | |
| Centurion (15) | | | |
| Randjesfontein (16) | | | |
| Kemptonpark (17) | | | |
| Midrand (18) | | | |
| Fourways (19) | | | |
| Lanseria (20) | | | |
| Edenvale (21) | | | |
| Benoni (22) | | | |
| Nigel (23) | | | |
| Springs (24) | | | |
| Heidelberg (25) | | | |
| Meyerton (26) | | | |
| Henley-on-klip (27) | | | |
| Vereeniging (28) | | | |
| Vanderbijlpark (29) | | | |
| Walkerville (30) | | | |
| Lenasia (31) | | | |
| Mulbarton (32) | | | |
| Alberton (33) | | | |
| Brakpan (34) | | | |
| Boksburg (35) | | | |
| Isando (36) | | | |
| Sandton (37) | | | |
| Randburg (38) | | | |
| Soweto (39) | | | |
| Oakdene (40) | | | |
| Germiston (41) | | | |
| Ormonde (42) | | | |
| Roodepoort (43) | | | |
| Randfontein (44) | | | |

| | | | |
|--------------------------|--|--|--|
| Krugersdorp (45) | | | |
| Ruimsig (46) | | | |
| Muldersdrift (47) | | | |
| Kromdraai (48) | | | |
| Magaliesburg (49) | | | |
| Carltonville (50) | | | |
| Elandsdrift (51) | | | |
| Cradle of humankind (52) | | | |
| Hekpoort (53) | | | |
| Doornhoek (54) | | | |
| Hennops River (55) | | | |
| Renosterspruit (56) | | | |
| Pretoria (57) | | | |
| Suikerbosrand (58) | | | |
| JohannesburgCBD (59) | | | |



Q10 How many members are there in your current household? (Total number of people living together)

_____ Household size (1)

Q11 In terms of the employment Equity Act of SA, to which population group do you (as person / not household per se) belong to?

- ☐ African (1)
- ☐ Asian (2)
- ☐ Coloured (3)
- ☐ Indian (4)
- ☐ White (5)
- ☐ Other (6)

Q12 What is your approximate total monthly household income rounded up to the nearest R1000?

_____ Monthly household income (1)

Q13 What is your preferred home language?

- ☐ Afrikaans (1)
- ☐ English (2)
- ☐ Ndebele (3)
- ☐ Northern Sotho (4)
- ☐ Sotho (5)
- ☐ Swazi (6)
- ☐ Tsonga (7)
- ☐ Tswana (8)
- ☐ Venda (9)
- ☐ Xhosa (10)
- ☐ Zulu (11)
- ☐ Other (12)

Q14 Please indicate your marital status

- ☐ Single without children / divorced / widowed (1)
- ☐ Single with children (2)
- ☐ Couple / Married (without children) (3)
- ☐ Couple / Married (with children) (4)

Q15 Please indicate the number of dependent children who are part of your household

_____ Children in household (1)

Q16 Please indicate how many children of the following age groups are currently part of your household

_____ Infants (0-2 years of age) (1)

_____ Toddlers and pre schoolers (>2 - 6 years of age) (2)

_____ Primary schoolers (>6 - 12 years of age) (3)

_____ Secondary schoolers (>12 - 18 years of age) (4)

_____ Number of adults that are currently part of your household (more than 18 years of age)
(5)

Q17 Carefully evaluate the following illustration, then click once on any picture or item within a picture you consider as food waste (shading that area). You are welcome to select multiple areas.

| | Off (1) | On (2) |
|--------------------------------------|---------|--------|
| Egg Shells (5) | | |
| Apple Core (6) | | |
| Half banana (7) | | |
| Tea bag (8) | | |
| Carrot trimmings (9) | | |
| Grape stalks (10) | | |
| Leek Leaves (11) | | |
| Tea bags (12) | | |
| Ground coffee (13) | | |
| Farmer skip filled with oranges (14) | | |
| Industry off-cuts (15) | | |
| Restaurant kitchen trimmings (16) | | |
| Plate wastage chicken drumstick (17) | | |
| Plate wastage mashed potato (18) | | |
| Plate wastage green beans (19) | | |
| plate wastage carrot (20) | | |
| Plate wastage carrot (21) | | |
| Plate wastage carrot (22) | | |
| Plate wastage sauce (23) | | |
| Plate wastage sauce (24) | | |
| Leek leaves (25) | | |
| Leek leaves (26) | | |
| Leek leaves (27) | | |
| Carrot trimmings (28) | | |
| Plate wastage french fries (29) | | |
| Plate wastage salad (30) | | |
| Plate wastage spaghetti (31) | | |
| Plate wastage purple cabbage (32) | | |
| Milkshake (33) | | |
| Retail prepackaged salad (34) | | |
| Retail Milk spoiled (35) | | |
| Retail boxed desserts (36) | | |
| Retail pre packed salad spoiled (37) | | |
| Tin can (38) | | |
| Plastic Bottle (39) | | |
| Cooldrink Coke (40) | | |
| Vegetable trimmings Avo (41) | | |
| Milkshake (42) | | |

| | | |
|------------------------|--|--|
| Orange peel (43) | | |
| Onion (44) | | |
| Carrot whole (45) | | |
| Orange peel (46) | | |
| Bread and cereals (47) | | |
| Carrot whole (48) | | |
| Tomato stalks (49) | | |
| Tomato stalks (50) | | |



Q18 Please select one of the provided definitions, which according to you best describes the concept food waste.

- ☐ Food waste is any solid or liquid food substance, raw or cooked, which is discarded, after the consumption of a meal (example: leftovers, food scraps or spoiled food) (1)
- ☐ Food waste is any solid or liquid food substance, raw or cooked, which is discarded, during the manufacturing, preparation and or consumption of a food product and or meal (example: organic residues generated by processing, handling, storage, sale, preparation, cooking, and serving of foods as well as leftovers or scraps) (2)
- ☐ Food waste is any solid or liquid food substance, raw or cooked, which is discarded, during the production and manufacturing of food products in industry. (3)

Q19 Please indicate who you believe should be held responsible for food wastage in South Africa

| | Strongly Disagree (4) | Disagree (5) | Neither Agree nor Disagree (6) | Agree (7) | Strongly Agree (8) |
|-------------------|-----------------------|-----------------------|--------------------------------|-----------------------|-----------------------|
| Retail (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Consumers (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Farmers (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Manufacturers (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Government (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q20 Please indicate who you believe is best equipped to address the problem of food waste in South Africa successfully

| | Strongly Disagree (4) | Disagree (5) | Neither Agree nor Disagree (6) | Agree (7) | Strongly Agree (8) |
|-------------------|-----------------------|-----------------------|--------------------------------|-----------------------|-----------------------|
| Retail (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Government (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Farmers (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Manufacturers (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Consumers (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q21 Reflecting on your consumption behavior during the last month / past 4 weeks, Please indicate how likely you are to waste the following food products in your household. (If you never buy a specific product, please select the not applicable tick box)

| | Very Unlikely (1) | Unlikely (2) | Undecided (3) | Likely (4) | Very Likely (5) | Not applicable (6) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Milk (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Yogurt (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cheese (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Butter (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cream (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Ice Cream (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Citrus fruit (e.g. Oranges, naartjies, lemons) (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Berries (8) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Stone fruit (e.g. Peaches, plums) (9) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q22 Reflecting on your consumption behavior during the last month / past 4 weeks, Please indicate how likely you are to waste the following food products in your household. (If you never buy a specific product, please select the not applicable tick box)

| | Very Unlikely (1) | Unlikely (2) | Undecided (3) | Likely (4) | Very Likely (5) | Not applicable (6) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Grapes (10) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hard fruit (e.g. apples and pears) (11) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Soft tropical fruit (e.g. Bananas, papaya, figs, guavas) (12) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Melons, Spanspek, Watermelon (13) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Pineapple (14) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Green leafy vegetables (Spinach, lettuce, salad greens) (15) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Root vegetables (Carrots, potatoes, sweet potatoes, beetroot, onions) (16) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Stem and cap vegetables (e.g. Mushrooms, asparagus) (17) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cabbage (cauliflower, broccoli, kale) (18) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q23 Reflecting on your consumption behavior during the last month / past 4 weeks, Please indicate how likely you are to waste the following food products in your household. (If you never buy a specific product, please select the not applicable tick box)

| | Very Unlikely (1) | Unlikely (2) | Undecided (3) | Likely (4) | Very Likely (5) | Not applicable (6) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------|
| Pumpkins (e.g. butternut, pattipans, zucchini/ babymarrow) (19) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Peppers (Sweet pepper e.g. Red, green yellow and or hot peppers) (20) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Peas and beans (21) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tomatoes (22) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cucumbers (23) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Mielies / sweet corn on the cob (24) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Avocado (25) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q24 Reflecting on your consumption behavior during the last month / past 4 weeks, Please indicate how likely you are to waste the following food products in your household. (If you never buy a specific product, please select the not applicable tick box)

| | Very Unlikely (1) | Unlikely (2) | Undecided (3) | Likely (4) | Very Likely (5) | Not applicable (6) |
|---|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------|
| Meat cuts: Beef (26) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Meat cuts: Mutton / lamb (27) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Meat cuts: Pork (28) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Meat cuts: Venison (e.g. Springbok, Blesbok, game biltong) (29) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Poultry products (e.g. chicken, turkey, duck) (30) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Fish (e.g. hake, salmon, tuna) (31) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Shellfish(e.g. prawns, mussels,oysters) (32) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Eggs (33) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q25 Reflecting on your consumption behavior during the last month / past 4 weeks, Please indicate how likely you are to waste the following food products in your household. (If you never buy a specific product, please select the not applicable tick box)

| | Very Unlikely (1) | Unlikely (2) | Undecided (3) | Likely (4) | Very Likely (5) | Not applicable (6) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------|
| Maize (pap) (34) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Rice (35) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Pasta (36) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Flour (e.g. cake / bread flour) (37) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Oats (38) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Sliced bread (39) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Bread rolls / buns (40) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Whole loaves (Bread) (41) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Vetkoek (42) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cakes (43) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Muffins / scones (44) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Doughnuts (45) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Pastries / pies (46) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Biscuits / cookies / rusks (47) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Baked puddings (48) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cold desserts (49) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q26 Reflecting on your consumption behavior during the last month / past 4 weeks, Please indicate how likely you are to waste the following food products in your household. (If you never buy a specific product, please select the not applicable tick box)

| | Very Unlikely (1) | Unlikely (2) | Undecided (3) | Likely (4) | Very Likely (5) | Not applicable (6) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------|
| Oils (e.g. olive, sunflower, avocado) (50) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hard fats / lard (51) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Margarine (52) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Vinegars (53) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Sauces/ Condiments (pesto, tomato, mustard, BBQ, mayonaise, chutney) (54) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Pickled products (Relish, atchar, olives, capers, artichokes, vegetables) (55) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Salad dressings (56) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Jams, marmalades and jellies (57) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Bread spreads (Peanut butter, Marmite/Bovril, Melrose cheese) (58) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Dry herbs and spices (59) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Chocolates (60) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hard sweets (e.g. lollipops, mints) (61) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Soft sweets (e.g. gums, jellies, marshmallows, toffees, fudge) (62) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q27 Reflecting on your consumption behavior during the last month / past 4 weeks, Please indicate how likely you are to waste the following food products in your household. (If you never buy a specific product, please select the not applicable tick box)

| | Very Unlikely (1) | Unlikely (2) | Undecided (3) | Likely (4) | Very Likely (5) | Not applicable (6) |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|--------------------------|
| Wine (63) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Champagne (64) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Beer (65) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Cider (66) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Spirits (Vodka, Gin, Whiskey, Brandy, Rum) (67) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Liquers (68) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Tea (69) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Coffee (70) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Hot chocolate (71) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Milk drinks (72) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Squash / cordials (73) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Fruit juice (74) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Carbonated soft drinks (e.g. Coke, Fanta, Sprite) (75) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Bottled water (76) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q28 Please rank the following food categories [DAIRY, FRUIT etc.] according to the extent that it is wasted in your household during one calendar month / during the last 4 weeks. Use the following ranking scale, with 1 = most wasted food type, and 12 = least wasted food type (please rank each food commodity by dragging and dropping the commodities in the ranking order that suits you.)

- _____ Dairy products (1)
- _____ Fruit (2)
- _____ Vegetables (3)
- _____ Meat (4)
- _____ Cereals (5)
- _____ Bread (6)
- _____ Cakes and pastries (7)
- _____ Desserts (8)
- _____ Oils (9)
- _____ Condiments (10)
- _____ Sweets (11)
- _____ Beverages (12)

Q29 Please indicate the amount (percentage) for each of the following commodities indicating waste per calendar month (4 weeks) in your household. i.e. we waste 20% of the dairy purchased in our household per calendar month. (If you never buy a specific commodity, please select the not applicable tick box)

- _____ Dairy products (1)
- _____ Fruit (2)
- _____ Vegetables (3)
- _____ Meat (4)
- _____ Cereals (5)
- _____ Bread (6)
- _____ Cakes and pastries (7)
- _____ Desserts (8)
- _____ Oils (9)
- _____ Condiments (10)
- _____ Sweets (11)
- _____ Beverages (12)

Q30 Please indicate the likelihood of the following statements causing non consumption, poor usage or discard of food in your household

| | Very Unlikely (22) | Unlikely (23) | Undecided (24) | Likely (25) | Very Likely (26) |
|-----------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Image:Childwasting (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Dieting (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Cheese (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Banana 3 630x466 (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Mi+greet+potatos+flickr (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Messyfridge (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Tomato fruitworm1241 (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Sellbydates (8) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Strsbdfruit299 opt (9) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Burnt toast (10) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Image:Buy1get2free (11) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q31 Please provide at least one barrier that limits your household in terms of curbing / addressing your weekly food wastage.

Q32 Please provide at least one suggestion that might encourage or enable your household to address your current weekly food wastage.

Q33 Among the categories below, please select the three categories in which you have generated the most waste in the past 4 weeks:

- ☐ Dairy products (1)
- ☐ Fruits (2)
- ☐ Vegetables (3)
- ☐ Meat (4)
- ☐ Cereals (5)
- ☐ Bread (6)
- ☐ Cakes and pastries (7)
- ☐ Desserts (8)
- ☐ Oils (9)
- ☐ Condiments (10)
- ☐ Sweets (11)
- ☐ Beverages (12)

Answer If Among the categories below, please select the three categories in which you have generated the mo... q://QID42/SelectedChoicesCount Is Less Than or Equal to 3

Q34 Based on the waste of \${lm://Field/1}, please indicate the degree to which each of the following factors have contributed towards the waste of \${lm://Field/1}.

| | Strongly Disagree (11) | Disagree (12) | Neither Agree nor Disagree (13) | Agree (14) | Strongly Agree (15) |
|--|---------------------------|-----------------------|------------------------------------|-----------------------|------------------------|
| Poor planning and purchasing decisions (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Improper packaging (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Insufficient storage (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Perishability of the product (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Personal food preferences (i.e. picky eaters) (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Date labelling of the product (i.e. sell by date) (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Incorrect preparation of the product (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Quality concerns (8) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Health and safety concerns (9) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Promotions and advertisements (10) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Poor time management (11) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Lack of knowledge pertaining to the product (12) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Lack of skills regarding utilization of the product (13) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Concerns regarding the appearance of the product (14) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Diets and trends (15) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Size and or quantity of the product (16) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| Pest invasion (17) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q35 Reflecting on your households' general food wastage please indicate the degree to which each of the following statements/reasons have contributed towards wastage.

| | Strongly Disagree (11) | Disagree (12) | Neither Agree nor Disagree (13) | Agree (14) | Strongly Agree (15) |
|---|------------------------|-----------------------|---------------------------------|-----------------------|-----------------------|
| We waste because we buy too large quantities. (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we buy in bulk. (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we buy too close to the sell by date. (3) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we buy too close to the expiry date. (4) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we buy too close to the "use by" date. (5) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we do not plan our purchases. (6) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we buy more than we need. (7) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the amount per pack is more than we can consume. (8) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q36 Reflecting on your households' general food wastage please indicate the degree to which each of the following statements/reasons have contributed towards wastage.

| | Strongly Disagree (11) | Disagree (12) | Neither Agree nor Disagree (13) | Agree (14) | Strongly Agree (15) |
|--|---------------------------|-----------------------|------------------------------------|-----------------------|------------------------|
| We waste because the amount per pack exceeds the amount that can be consumed before the product loses quality. (9) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the packaging does not provide proper protection to the product. (10) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the packaging is difficult to empty. (11) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because, once opened, the packaging cannot be resealed. (12) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we do not have proper information regarding correct storage. (13) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we are not properly informed about the perishability of the product. (2) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we do not have sufficient or correct storage space available e.g. freezer / refrigerator. (1) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q37 Reflecting on your households' general food wastage please indicate the degree to which each of the following statements/reasons have contributed towards wastage.

| | Strongly Disagree (11) | Disagree (12) | Neither Agree nor Disagree (13) | Agree (14) | Strongly Agree (15) |
|--|------------------------|-----------------------|---------------------------------|-----------------------|-----------------------|
| We waste because we often forget about the product in storage. (16) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because pests might infest the product in storage. (17) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| we waste because we do not prefer to store left over food. (18) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the sell by date indicated that the product had expired. (19) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the expiry date indicated that the product had expired. (20) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q38 Reflecting on your households' general food wastage please indicate the degree to which each of the following statements/reasons have contributed towards wastage.

| | Strongly Disagree (11) | Disagree (12) | Neither Agree nor Disagree (13) | Agree (14) | Strongly Agree (15) |
|---|---------------------------|-----------------------|--|-----------------------|------------------------|
| We waste because we do not have proper information regarding the preparation of the product. (22) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we often prepare food incorrectly. (23) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we often prepare too much. (24) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we often serve food incorrectly. (25) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we are concerned about the health and safety of the product. (26) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the food product appears unappetizing although it might still be edible (27) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q39 Reflecting on your households' general food wastage please indicate the degree to which each of the following statements/reasons have contributed towards wastage.

| | Strongly Disagree (11) | Disagree (12) | Neither Agree nor Disagree (13) | Agree (14) | Strongly Agree (15) |
|---|------------------------|-----------------------|---------------------------------|-----------------------|-----------------------|
| We waste because the product might seem slimy / moldy (28) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the product might smell bad (29) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| we waste because the product has an unappetizing texture (30) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the promotional material in the store prompted me to buy in excess (32) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the promotional material in the store prompted me to buy these products even though it was not on my list (33) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because I'm easily swayed to buy new or interesting products from this category (34) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we try to abide to new trends, fads or diets concerning these commodities (35) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q40 Reflecting on your households' general food wastage please indicate the degree to which each of the following statements/reasons have contributed towards wastage.

| | Strongly Disagree (11) | Disagree (12) | Neither Agree nor Disagree (13) | Agree (14) | Strongly Agree (15) |
|--|------------------------------|-----------------------|---------------------------------------|-----------------------|------------------------|
| We waste because we do not have the correct information to utilize the commodity. (36) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we do not have the necessary culinary skills to utilize the commodity. (37) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we do not have sufficient time to recycle or compost the commodity. (38) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we do not have time to plan a menu that includes these commodities. (39) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we believe that buying these products are essential to our well being. (40) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because we believe that buying these products are part of a healthy diet. (41) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q41 Reflecting on your households' general food wastage please indicate the degree to which each of the following statements/reasons have contributed towards wastage.

| | Strongly Disagree (11) | Disagree (12) | Neither Agree nor Disagree (13) | Agree (14) | Strongly Agree (15) |
|---|------------------------|-----------------------|---------------------------------|-----------------------|-----------------------|
| We waste because we believe that buying these products reflects success. (42) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the product appeared to be of poor quality. (43) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the product appeared bruised. (44) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the product appeared deformed. (45) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the product appeared blemished. (46) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the product appeared rotten. (47) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| We waste because the product appeared old. (48) | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

Q42 Thank you very much for sharing your views with us.

ADDENDUM C

PHASE 2 - QUESTIONNAIRE MEASURING SUBJECTIVE KNOWLEDGE



Department of Consumer Science

Questionnaire: Consumers' subjective knowledge of date labelling

Informed Consent Form

Dear Respondent

The purpose of this study is to gain insight into consumers' knowledge of date labelling. Participants in this study will be asked to answer 3 questions regarding their knowledge on date labelling. All answers will be recorded for further use by the investigators only. Respondents are welcome to refrain from answering any questions that they view to be the cause of any discomfort or infringement of their privacy. Refusal to participate or withdrawal of consent, or discontinued participation in the study will not result in any penalty. Please note that your participation is voluntary and does in no way release the researchers or involved institutions from their legal and professional responsibilities. All information will be treated as highly confidential and the identity of respondents need not to be disclosed and will remain anonymous. The results of this study will be presented in aggregated format.

Your decision to respond to the questions posed will be interpreted as confirmation that you have agreed to participate.

Thank you for taking the time to share your perspectives and views in this regard.

Kind Regards
Natashka Venter

Questions

Please indicate if you agree on the following 3 statements. Compared to other consumers....

| | Strongly Disagree | Disagree | Neither Agree nor Disagree | Agree | Strongly Agree |
|--|-----------------------|-----------------------|----------------------------------|-----------------------|-----------------------|
| 1. I am well informed about sell by dates. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 2. I am well informed about use by dates. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |
| 3. I am well informed about best-before dates. | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> | <input type="radio"/> |

ADDENDUM D

PHASE 2 - QUESTIONNAIRE MEASURING OBJECTIVE KNOWLEDGE



Department of Consumer Science

Questionnaire: Consumers' objective knowledge of date labelling

Informed Consent Form

Dear Respondent

The purpose of this study is to gain insight into consumers' knowledge of date labelling. Participants in this study will be asked to answer 10 true/false questions regarding their knowledge on date labelling. All answers will be recorded for further use by the investigators only. Respondents are welcome to refrain from answering any questions that they view to be the cause of any discomfort or infringement of their privacy. Refusal to participate or withdrawal of consent, or discontinued participation in the study will not result in any penalty. Please note that your participation is voluntary and does in no way release the researchers or involved institutions from their legal and professional responsibilities. All information will be treated as highly confidential and the identity of respondents need not to be disclosed and will remain anonymous. The results of this study will be presented in aggregated format.

Your decision to respond to the questions posed will be interpreted as confirmation that you have agreed to participate.

Thank you for taking the time to share your perspectives and views in this regard.

Kind Regards
Natashka Venter

True/ False Questionnaire

Please indicate if the following statements are True / False.

| | Question | True | False |
|-----|--|------|-------|
| 1. | A use by date tells the consumer the last date recommended for safe consumption | | |
| 2. | A sell by date tells the store how long the date can be extended on the shelf from that date | | |
| 3. | Best if used by date on fresh produce is used to evaluate if the food is at its highest quality that day. | | |
| 4. | The purpose of a sell by date is to tell the store how long the date can be extended on the shelf from that date | | |
| 5. | The purpose of a use by date is to tell the consumer the last date recommended for safe consumption | | |
| 6. | Use-by date is evaluated by consumers to determine the taste of fresh produce | | |
| 7. | Products that are high in price should only contain date labels | | |
| 8. | Products that are non-perishable should contain date labels | | |
| 9. | Products that are only high in quality and safety should contain date labels. | | |
| 10. | Products that are refrigerated should also contain date labels | | |

Thank you

ADDENDUM E:

PHASE 2 - FOCUS GROUP DISCUSSION PROMPTS

| |
|--|
| What does use by date on fresh produce indicate? |
| What does sell by date on fresh produce indicate? |
| What does best if used by date on fresh produce indicate? |
| What is the purpose of a sell by date? |
| What is the purpose of a use by date? |
| Why do you use/evaluate use by date on fresh produce? |
| Does price determine when fresh produce should contain date label or not? Why/Reason? |
| Do you think non-perishable items should only contain date label? Why / reason? |
| Should items that are only high in quality contain date label? |
| Should fresh produce that are re-fridge rated contain date labels? |

ADDENDUM F:

RESULTS CONSUMPTION BEHAVIOUR

QUESTION 20. Reflecting on your consumption behavior during the last month / past 4 weeks. Please indicate how likely you are to waste the following food products in your household. (If you never buy a specific product, please select the not applicable tick box)

| # | Question | Very Unlikely | Unlikely | Undecided | Likely | Very Likely | Total Responses | Mean |
|----|---|---------------|----------|-----------|--------|-------------|-----------------|------|
| 1 | Milk | 490 | 395 | 60 | 235 | 71 | 1,251 | 2.20 |
| 2 | Yogurt | 364 | 364 | 90 | 285 | 95 | 1,198 | 2.48 |
| 3 | Cheese | 488 | 425 | 73 | 218 | 47 | 1,251 | 2.13 |
| 4 | Butter | 627 | 406 | 54 | 79 | 25 | 1,191 | 1.71 |
| 5 | Cream | 242 | 315 | 101 | 272 | 84 | 1,014 | 2.65 |
| 6 | Ice Cream | 545 | 334 | 62 | 89 | 32 | 1,062 | 1.80 |
| 7 | Citrus fruit (e.g. Oranges, naartjies, lemons) | 341 | 457 | 117 | 242 | 61 | 1,218 | 2.36 |
| 8 | Berries | 313 | 350 | 99 | 172 | 39 | 973 | 2.25 |
| 9 | Stone fruit (e.g. Peaches, plums) | 302 | 377 | 129 | 216 | 43 | 1,067 | 2.36 |
| 10 | Grapes | 324 | 453 | 91 | 181 | 42 | 1,091 | 2.23 |
| 11 | Hard fruit (e.g. apples and pears) | 309 | 476 | 97 | 273 | 71 | 1,226 | 2.45 |
| 12 | Soft tropical fruit (e.g. Bananas, papaya, figs, guavas) | 267 | 400 | 107 | 317 | 116 | 1,207 | 2.68 |
| 13 | Melons, Spanspek, Watermelon | 262 | 395 | 79 | 200 | 50 | 986 | 2.37 |
| 14 | Pineapple | 304 | 424 | 84 | 183 | 51 | 1,046 | 2.29 |
| 15 | Green leafy vegetables (Spinach, lettuce, salad greens) | 235 | 365 | 88 | 394 | 148 | 1,230 | 2.88 |
| 16 | Root vegetables (Carrots, potatoes, sweet potatoes, beetroot, onions) | 331 | 494 | 82 | 278 | 75 | 1,260 | 2.42 |
| 17 | Stem and cap vegetables (e.g. Mushrooms, asparagus) | 286 | 397 | 104 | 262 | 69 | 1,118 | 2.49 |
| 18 | Cabbage (cauliflower, broccoli, kale) | 263 | 418 | 100 | 285 | 88 | 1,154 | 2.58 |
| 19 | Pumpkins (e.g. butternut, pattipans, zucchini/ babymarrow) | 337 | 436 | 94 | 248 | 70 | 1,185 | 2.39 |
| 20 | Peppers (Sweet pepper e.g. Red, green yellow and or hot peppers) | 280 | 375 | 105 | 292 | 79 | 1,131 | 2.57 |
| 21 | Peas and beans | 354 | 442 | 102 | 191 | 49 | 1,138 | 2.24 |
| 22 | Tomatoes | 271 | 376 | 86 | 379 | 131 | 1,243 | 2.78 |
| 23 | Cucumbers | 270 | 352 | 89 | 367 | 126 | 1,204 | 2.77 |
| 24 | Mielies / sweet corn on the cob | 367 | 424 | 96 | 178 | 30 | 1,095 | 2.16 |

| | | | | | | | | |
|----|---|-----|-----|-----|-----|-----|-------|------|
| 25 | Avocado | 370 | 378 | 80 | 273 | 81 | 1,182 | 2.42 |
| 26 | Meat cuts: Beef | 659 | 417 | 43 | 84 | 29 | 1,232 | 1.71 |
| 27 | Meat cuts: Mutton / lamb | 594 | 409 | 40 | 65 | 25 | 1,133 | 1.69 |
| 28 | Meat cuts: Pork | 545 | 365 | 54 | 87 | 23 | 1,074 | 1.77 |
| 29 | Meat cuts: Venison (e.g. Springbok, Blesbok, game biltong) | 490 | 288 | 41 | 49 | 13 | 881 | 1.65 |
| 30 | Poultry products (e.g. chicken, turkey, duck) | 581 | 431 | 61 | 125 | 44 | 1,242 | 1.89 |
| 31 | Fish (e.g. hake, salmon, tuna) | 551 | 409 | 75 | 98 | 28 | 1,161 | 1.83 |
| 32 | Shellfish(e.g. prawns, mussels,oysters) | 335 | 234 | 64 | 65 | 31 | 729 | 1.93 |
| 33 | Eggs | 618 | 404 | 52 | 112 | 53 | 1,239 | 1.85 |
| 34 | Maize (pap) | 337 | 293 | 81 | 167 | 68 | 946 | 2.30 |
| 35 | Rice | 457 | 375 | 61 | 226 | 69 | 1,188 | 2.22 |
| 36 | Pasta | 510 | 405 | 70 | 179 | 34 | 1,198 | 2.02 |
| 37 | Flour (e.g. cake / bread flour) | 452 | 409 | 86 | 124 | 44 | 1,115 | 2.01 |
| 38 | Oats | 463 | 390 | 67 | 127 | 38 | 1,085 | 1.97 |
| 39 | Sliced bread | 289 | 350 | 79 | 335 | 144 | 1,197 | 2.75 |
| 40 | Bread rolls / buns | 263 | 330 | 119 | 336 | 114 | 1,162 | 2.75 |
| 41 | Whole loaves (Bread) | 324 | 360 | 77 | 217 | 91 | 1,069 | 2.43 |
| 42 | Vetkoek | 242 | 265 | 79 | 126 | 32 | 744 | 2.25 |
| 43 | Cakes | 295 | 345 | 86 | 211 | 50 | 987 | 2.37 |
| 44 | Muffins / scones | 342 | 360 | 77 | 181 | 30 | 990 | 2.19 |
| 45 | Doughnuts | 279 | 274 | 60 | 126 | 24 | 763 | 2.14 |
| 46 | Pastries / pies | 314 | 397 | 84 | 118 | 29 | 942 | 2.10 |
| 47 | Biscuits / cookies / rusks | 510 | 457 | 58 | 95 | 25 | 1,145 | 1.84 |
| 48 | Baked puddings | 276 | 338 | 83 | 154 | 29 | 880 | 2.23 |
| 49 | Cold desserts | 342 | 397 | 97 | 119 | 19 | 974 | 2.05 |
| 50 | Oils (e.g. olive, sunflower, avocado) | 653 | 395 | 72 | 93 | 30 | 1,243 | 1.75 |
| 51 | Hard fats / lard | 259 | 207 | 102 | 109 | 77 | 754 | 2.39 |
| 52 | Margarine | 537 | 399 | 53 | 60 | 28 | 1,077 | 1.74 |
| 53 | Vinegars | 590 | 381 | 63 | 76 | 28 | 1,138 | 1.74 |
| 54 | Sauces/ Condiments (pesto, tomato, mustard, BBQ, mayonaise, chutney) | 465 | 440 | 86 | 195 | 56 | 1,242 | 2.14 |
| 55 | Pickled products (Relish, atchar, olives, capers, artichokes, vegetables) | 371 | 372 | 74 | 184 | 46 | 1,047 | 2.20 |

| | | | | | | | | |
|----|--|-----|-----|----|-----|----|-------|------|
| 56 | Salad dressings | 333 | 362 | 86 | 227 | 64 | 1,072 | 2.37 |
| 57 | Jams, marmalades and jellies | 399 | 425 | 85 | 197 | 34 | 1,140 | 2.16 |
| 58 | Bread spreads (Peanut butter, Marmite/Bovril, Melrose cheese) | 553 | 457 | 72 | 95 | 29 | 1,206 | 1.83 |
| 59 | Dry herbs and spices | 672 | 385 | 50 | 101 | 31 | 1,239 | 1.74 |
| 60 | Chocolates | 747 | 324 | 48 | 48 | 21 | 1,188 | 1.55 |
| 61 | Hard sweets (e.g. lollipops, mints) | 469 | 284 | 66 | 112 | 50 | 981 | 1.97 |
| 62 | Soft sweets (e.g. gums, jellies, marshmallows, toffees, fudge) | 594 | 327 | 59 | 71 | 31 | 1,082 | 1.72 |
| 63 | Wine | 518 | 281 | 66 | 94 | 35 | 994 | 1.84 |
| 64 | Champagne | 356 | 171 | 64 | 67 | 34 | 692 | 1.92 |
| 65 | Beer | 502 | 241 | 44 | 62 | 28 | 877 | 1.71 |
| 66 | Cider | 394 | 261 | 50 | 64 | 24 | 793 | 1.82 |
| 67 | Spirits (Vodka, Gin, Whiskey, Brandy, Rum) | 503 | 218 | 55 | 46 | 27 | 849 | 1.68 |
| 68 | Liquers | 415 | 227 | 55 | 67 | 37 | 801 | 1.86 |
| 69 | Tea | 713 | 333 | 46 | 85 | 48 | 1,225 | 1.71 |
| 70 | Coffee | 739 | 304 | 45 | 91 | 34 | 1,213 | 1.66 |
| 71 | Hot chocolate | 549 | 327 | 64 | 81 | 20 | 1,041 | 1.75 |
| 72 | Milk drinks | 388 | 367 | 76 | 175 | 51 | 1,057 | 2.18 |
| 73 | Squash / cordials | 398 | 316 | 79 | 113 | 21 | 927 | 1.97 |
| 74 | Fruit juice | 506 | 394 | 66 | 139 | 46 | 1,151 | 1.98 |
| 75 | Carbonated soft drinks (e.g. Coke, Fanta, Sprite) | 490 | 331 | 56 | 149 | 49 | 1,075 | 2.01 |
| 76 | Bottled water | 635 | 266 | 34 | 61 | 42 | 1,038 | 1.66 |

ADDENDUM G:

FOCUS GROUP DISCUSSION TRANSCRIPTION

Focus Group– Discussion A (F1)

Camera setup

P1 - Ok,

P3- Must me move up a bit?

P1 – No it is fine

Introduction

P1 – So, thank you everybody for accepting my short notice invitation. Thank you for your time I really do appreciate it. So uhm, first off all, uhm, The information here – if you would like to withdraw at any time you can – and you are free to say whatever you feel like. There are no right or wrong answers. The idea of this focus group is just to get your opinions of certain stuff. My research is also assisting the csir research project on date labelling, our main thing is to see what do consumers think what date labelling means. Do they really understand the meaning? We are having different focus groups – this will be the first one. So- uhhh – ja.... You are free to ask any questions, so uhm.. We will have 10 main topics of discussions, and the focus group will be about 30minutes.

P1- So what does use by date on fresh produce indicate? So what do you think it indicates? A USE BY date.

P2 – It tells the last date, acceptable date to use it

P3– Recommended date

P1 – *Stand up... sorry I just want to record it as well...*

P1 – Any other suggestions?

P4- Cathy – It's a use by date?

P1 – Yes

P4 – A use by date is – like it will be best to use it in that recommended date. But not necessarily – if it is food it will be off or anything like that. It still has a short life span.

P1 – So the next question – **What do you think a sell by date on fresh produce mean?**

P3- The longest it should sit on the shelf at the shop or at the consumers house. But that will be based on some guideline how long it is expected to be in the consumers hand.

P5 – And it is different than the use by date.

P1 – Any other suggestions?

P1 – **What do you think a best if used by date means? Or indicate on fresh produce.**

P5 – It will be freshest, best quality if it is used by a best by date.

P6 – yes - on the product

P1 – Okey, and **do you think all 3 terms that I have just mentioned – is similar or not at all similar?**

P3– No, not at all.

P1 – **What do you think the purpose is of a sell by date?**

P3 – Safety

P6 – Mmm (agree)

P5 – Recommendation for freshness and food taste

P7 – I think the sell by date is more for the shop itself instead and instead of the consumer ; and a use by date is more for the consumer.

P5 – I personally go for both, because ...And a lot off... and whether it also depend on if it is clean or some non-perishables, like in your questionnaire it might not necessarily have a sell by date but best by date or visa versa. So it depends what it is I suppose.

P1 – Ok.

P1 – And **What do you think is the purpose of a use by date?**

P1 – Use-by date

P2 – Ja, tells you about a certain date you should use the product.

P5 – And also, once again it is a recommendation because a lot of the times.....

P3 – Its actually fine if you consider it the date after

P5 - if you check pharmaceuticals for instance they will say use by November – but it will last a year or two longer; actually. So it is just for safety and..

P3 - I don't think its safe

P6 – I don't use it

P5– It might work a bit less – but its not going to kill you

P4 – Ja

P5 – It could...

LAUGHTER

P6 - But it last longer so...

P4 – They do, like ive got this vitamins – they are 100 of them in there. Somebody sent them to me and she didn't check the date and it had expired last year and I was still taking them. Then my daughter mentioned to me – you know that you are actually taking those vitamins they expired a year ago..

P5 – But exactly, it also in dignifies the manufacturer –

P3 - ... should you have a bad query]

P5 .. or it is not working... So the best by date or sell by date has expired a year ago – so it is not my problem. Or even if it goes mouldy after the sell by date its not their problem. Even though its just a week old or whatever

P1 – Ok, and **do you usually evaluate use by dates on food?**

P6 – It depends on what product it is....

P4 – It depends whether it is at the shop or at your house. At my house I pay attention, but when shopping I might never look.

P6 – No, intend to do the shop.

P4 – I also do

P7 – I feel like I pay more attention if it is like mould and stuff like that. But it's gonna be like can food or something like that

P6 – Because can food last longer ... because it will be like 2020

LAUGHTER...

P5 – Uh, I check it..

P1 – and **like fresh produce – like fruit and vegetables and stuff - do you's check dates on that?**

P6 – Yes yes I look at the food right... especially bread because it goes moldy..

P5 – You know it's like meat – you do know it is going to go off. So that does give you an indication. So if it says sell by the 20th, use by the 21st and you planning it for next week – obviously you going to check for another date first before ...

P3 – I normally pick it up and smell it... And then everyone is like – what is wrong?

P3 – No... I'm just checking.

P7 – I usually go to the last one on the shelf – the freshest stuff.

P2– The lowest bread they also put the newest bread

P4 – But if you go to certain shops - I don't know if I'm allowed to mention – Woolworths – when they say their dates and they put their dates their – you buy the thing and you don't use it. It does, it effects it somehow, but if you go to another shop say for instance, the housewife market , buy the same thing the same medicals the same day Woolworths one will go off in the specified time they said you should use it but that one wont – I don't know..

P7 –I noticed that with their milk as well – it does not last as long as Clover

P5 – But suppose.... like if you go to Checkers Hyper or whatever – you know you get those red stickers stuff where they take use by and sell by date and they discount it to 10 bucks ... buy this whole bag of potatoes for 10 bucks – and it actually last long. You know, but I suppose they are not allowed to sell it after specific date, but Im sure it is regulated, isn't it?

P4 – That is why they give it away.

P3 – I like cheap cheese at Checkers. Because they also do that – you pay like 10bucks for a block of cheese

LAUGHTER

P5 – Really? I haven't seen that – laughter...

P1 – And why do you use or evaluate use by dates?

P3 – Because it is horrible to have to throw away food all the time.

P5 – And it is an indication of quality, safety and quality...

P7 – And it is like sometimes the expiry date is not about the product itself but about the packaging, like they put an expiry date on water it's not about the water but how long the packaging is suitable.

P3 – Ja until it starts going into the water

P7 – Ja it is more about the packaging

P5 – Ok

P1 – And does price determine if fresh produce should contain date labelling or not?

All – No

P1 – Why do you say no?

P6 – Even cheap stuff – they need to have a sell by date.

P3 – Because it is a bigger risk for safety and stuff

P2 – mmm (Agree)

P1 – Do you think non-perishable items should only contain date labelling?

All – No

P2 – No, everything

P5 – No – everything.... She's trying to catch us...

LAUGHTER

P1 – Ok, and why do you suggest perishable items should have date labelling?

P2 – to have a higher grade

P3 – To give you an indication when it has been packed and when it has been made

P5 – As well

P3 – If you are buying a cake or something from Woolworths – you rather have it made yesterday or today than like 5days later.

P1 – Ok, **and should items that are high in quality contain date labelling?**

All – yes ... GIGGLE

P1 – And **should fresh produce that are re-fridge rated contain date labelling?**

All – Yes...

P1 – Ok, that is that... Thank you very much

P5: WE WANT DATE LABELS

LAUGHTER

P1 – **Uhm.. do you's think that date labelling influences household fresh produce waste?**

P3 – Yes

P5 – Uhm, Ja

P7 – Yes

P3– A lot

P1 – **So even if something looks fine – you will still through it away because of the date label on the pack?**

P5 – Uhm like Lyn says – most probably a bit to much..

P3 – I've had stuff in my fridge and you open it up – you buy it and don't use it – Like cottage cheese. You don't open it, you don't use it – it just sits there for a month; and it is actually still fine. But because the date says like 2weeks ago.. you like

P5 – JA...

P5 – Recently I have actually checked out quite a view websites that shows you – if you go on... lets say that meat for instance, so uhm you have meat that you brought on Monday, now

it is Friday and its sell by date or use by date is today. But if you go onto some of these sites - its like regulated site. The meat will last in the fridge for 2weeks, whereas the sell by date was 4days. But I mean – so I don't chuck stuff. For example, if it is stuff that is expensive like steak you know.. so I have been checking out these sites quite a bit and there is certain things that last very long – much longer than the sell by date.

P7 – like ham last long, except if it like processed meat, like sausages..

P3 – Ja that can last definitely

P5 – Ja that can last

P7 –sausages and like burger patties won't last as long as the meat itself

P5 – And uhm so that's why sell by date and use by date is a recommendation more than a rule

P1 – And do you think the consumers in South Africa understand the meaning of the dates on the packaging?

P6 – No, not really

All – No..

P1 – Not really?

All – No.

P1 – And the differences between the dates like use by date, sell by date and best if used by date

P3 – I think if they got everything there – you kind off figure it out.

P7 – And most of the time there are like two...

P6 – And most off the time people do not really care - like they do not really look at the use by date or sell by date - they just like ... let's see.. you evaluate with your eyes and that's that..

P1 – ok

P6 – and then you like – yeah – I think it is fine ... and then you take it

P1 – And if you buy fresh produce like lettuce or tomato and it has a date label on and it has expired - uhmm – and the tomato still looks fresh will you still use it?

P3 – Yes I do

P6 – Use it, yes

P4 - I will use it but not buy it

P1 – ok, so you will use it but not buy it...

P1 - And if it is like half price?

HESITANCE...

Don't know...

P3 – definitely I would. I can't miss a bargain.

P5 – R10 bag potatoes...

P6 – It depends on how fast you want to use it

P3– I can't miss bargain..

LAUGHTER

P5 – Certain things you can see, like cauliflower for instance, if it has the R5 red sticker you can see and also you will not leave it in your fridge for 3weeks

P6 – Cucumbers, I won't buy it if it is like off – no... I won't buy with the red sticker, I will buy it in terms of price because it gets a little funky inside... like hugh-ugh

P7 – It gets funky anyway ... so just make some cucumber sandwiches

Focus Group – Discussion 2

(F2)

P1 – Thank you everybody for attending ... for your very busy schedule, especially for today getting ready for audits...and taking the time. Uhh...So all the information today discussed will not be shared with any other institute except for the University of Pretoria and the CSIR. All other personal information will be kept confidential. And if you feel to withdraw at any stage, you may and there is no right or wrong answers - the floor will be open for any discussions related to the themes that I will be guiding the group by. Ok, so today's discussion will be about date labelling: use by dates, sell by dates, best if used by dates – specifically on fresh produce.

P1 – So – What does a use by date on fresh produce indicate?

P1 – what do you think it indicates? A use by date.

P2 – Date on which it is still the freshest

P1 – Sorry I just want to put my recorder on as well – I don't want to be doing this again.....

P1 – and, any other suggestions on a use by date?

P3– Ja, I think that the store, whatever store it is saying that you should be using that product up until that date. And the implication even though they don't say it – there could be something wrong with it – or it is not that fresh anymore after that. That like to me implied – you know..

P4 – Mmm

P3– Otherwise – why say use by? You know what if you don't use by?

P5 – Maybe it can be that – if they say use by – you can keep it until beyond that date ... they just try to put themselves in a safe position, even though you don't find it in a good condition to use it – they don't have that allowance to tell you to use it – this is how y use it.. So I believe that they are just preserving themselves from the institution of right

P3 – 100%, good point.

P1 – And uhm – what does a sell by date on fresh produce indicate?

P2 – The product should be out of the shop by that date.

P3 – Agree

P4 – Agree

P1 – And a best if use by date?

P4 – what..?

P1 – Best if used by date. Indicate on fresh produce?

P3 – Well if it is BEST used by then - then if you use it afterword's it might not be at its best either nutritionally, it will be compromised or freshness will be compromised. Or if it is fresh produce then maybe it is overripe.. you know.

P1 – And do you think there is confusion amongst consumers?

P4 – There is ja, like im thinking now – is it best to use for you, or is it the product that is best? Yes, so it can be interpreted best for you or best for the product?

P1 – Do you think there is generally confusion amongst consumers?

All – yes Hugely

P1 – And if you have to take yourselves as example?

P2 – Mmm I'm very picky with my bread. Yes my bread... I don't take notes so don't know where it goes.. so with my bread Im just like... no Even the ones at the top – if you go to Shoprite - the ones at the top sell by dates are usually a bit higher. The ones at the bottom.. they like take it and go... it means this has to go out of the shop... the ones up there they are fresh. So you reach – and Im very short so you just go there – ja ...

LAUGHTER

P2 – we do that...

P3 – Ja, uhm ... I see these sell by dates and whatever is very much to protect the store, like you know.. uhhmm.. if you ... if you go back let's say for example you have not seen the use by date or sell by date whatever and you see that it has expired you've automatically got this impression that something is now wrong with it – you know, like if its meat or chicken or whatever – you think to yourself oh my goodness Im I like gonna poison my family if I cook this? Because now the sell by date has gone. I mean for me I always check the actual

whatever it is, so if it is like fresh produce I will check the actual item, if it is bananas I want to see if the bananas look fresh. Im not really that interested in the use by or sell by date if I can see that the produce looks good. But if it is like meat, and it is in a plastic bag, you know like covering it and whatever. Uhm I am very bad. What I always do is – I make a whole in the plastic and I smell it. ALWAYS.

P2 – In the sop?

P3 – In the shop.

LAUGHTER

P3 – I make a whole in the bag.

P5 – what if they see you

P3 – No they can see me. I am entitled to know if I'm buying something that is fresh..

LAUGHTER

P2 – Imagine poking the bag and going..."smelling"... in the shop.

P3 – You know my son - if it is ever his turn to cook ok, and he sees that there isn't a whole in the thing that is defrosted – you know what I mean.. Like when he is taking it out of the fridge or whatever and then he goes like why didn't you check it.

P2 – Myaby we should start doing that...

P3 - I always make a whole to see. If you ever

P4 – So from now on... whenever I go to the store and I see a whole in there.. I will put it aside.. so I maybe don't know if you put in your fingers

P3 – OOH now I will never touch it, but I always open it. Because me – especially chicken that is off – it stinks terribly.

P1 – And will you do it with fresh produce as well?

P3 – No – Because I will look if I buy fruit or whatever. I check that apples aren't full of bruises and I check that bananas aren't full of bruises or whatever fruit I am buying you know and then like my fresh produce Im buying brokkoli or whatever I check to see that it doesn't have yellow bits on it or whatever – that it is already old. So the sell by date for that does not really count much for me. Because I look at the stuff.

P4 – The thing about all of this is they don't educate people on what what means - so that's where the confusion is. Because like best-before mean best-before today – that means you should have brought it yesterday and not today because today it should be off. So you don't know if you should use it like the day before that says best-before the 8th July so then you must use it by the 7th only because the 8th is not best-before .

P2 – So it is like you can still use it by 12/ midnight, if it is still the 8th then its fine, but when it is the 9th – you like WOW..... Is this still right or what.

P3 – There is an implication that if that date has expired that potentially whatever it is –it not.. that there is something wrong with it.

P4 – Not necessarily, but ja..

P3 – Ja... but that is what you think ...

P4 – If you eat this now – there's an implication

P2 – I think it depends on the product - specifically the product –what the product is then you take it from there, If it is milk and you see that the sell by date or use by date is off – then you shouldn't take it.

P3 – can you imagine...

P4 – Isn't it with milk people in the old days just check (smell) is it sour, is it not sour...

P2 – Ja milk..milk...

P3 – Exactly.. You do smell it ... see

P4 – It is either that or you taste that it is sour, then you through it away. But now they tell you by this day and then 2 or 3 days later the milk is still fine, so .. or is it a gimic to get you to buy more milk or... Because now you are throughing it away like maybe 2 cartons that you could of used.

P5 – But you know like – maybe it has happened to me you see... the fact is that it is the tin, even if you look the tin food somehow you feel like.. eish you had some infect... I don't know if it has happened to me or not,.

P4 – Specially now – you have to be so sure

P5 – but I didn't see it – but maybe if I saw it I know im gonna have a big problem.

LAUGHTER

P2 – If I'm at my house and I'm like ... Ohh no., I just see what happened.. I will take it. If I have bought it and the use by date is off I will still take it because I think I would of stored it properly...

P4 – It is all about how you store it also.. Is it autumn is summer is it winter and all of those kind of things

P2 – but in the shop I wouldn't take it

P5 – I brought a juice and I was drinking I don't know what happened I was just checking the ingredients at the back. It was half and then I returned it to the store. They asked you didn't check it, and I said no I didn't and Im taking your stuff off the shelf..

P5 – And now Im like always wondering if something happened to me

P3– And sometimes when you shopping you see stuff that has expired but it is still there. And I feel uhm that the store is actually being irresponsible for putting you at risk because they are not removing stuff that is already "off".

P2 – What they do is that they take it to 2% off...like, BOOM.. R9 lettuce..

P5 – they do it a day before

P2 – Day before, then you buy it – and then tomorrow it's like what happened to my lettuce?
...Then you think it's because I brought it at the product discount.

P4 – My wife and I was discussing this last night - If you buy avo's and you chop it up and you put it into your bag you can freeze it for 24months. And it will still be fresh.

P6 – Is it?

P3 – Ripe Avo?

P4 – Ja, avos..

P5 – come again?

P3– for how long?

P2 – 24hours

P4 – Ja, to take an avo right, you scoop out all the meat, you mince it and you put it in a freezer bag. You can freeze it for 24months. Bananas also if you get them and you chop them up, you freeze it for 12months. And you defrost it and you can still use it.

P6 – Will it still be fine?

P2 – still be fresh

P6 – Ja...

P3 – I wonder if the nutritional value...

P4 – No if you can use it for cooking and guacamole and that kind of thing ... that avo will be perfect for that

P3 - But what about the nutritional value? I mean if it is frozen for so long – is the nutritional value compromised?

P4 – It shouldn't be. Unless you defrost it and you leave it standing so it oxidise again, because that what happens with the fresh fruit they oxidize – your vitamins go down, your sugar levels go down and all of those kind of things.

P5 – But like buy peas in any season but avocados it is not.. But they will give you avocado.

P4 – I know because it has been cold storage. That's why there is no season for food anymore.

P3 – For R54 for 2 No.. I won't

P4– I brought avos in Durban though , they were so cheap .. big big big ones but like R6 for one. But the avo we have here is that butter avo, which is a little bit sort of thinner and taste a little bit more watery than the one from Durban ja..

P2 – I don't like the big big stuff, normal size.

P3 – I haven't seen cheap avos that are very nice

P4– I was on my week holiday and I was even surprised when I saw it....

P1 – Ok and then what is the purpose of the sell by date?

P2 – It is the date that the product needs to be out of the shop

P1 – And the purpose of it?

P5 - To protect the consumers

P4 – the store of it - stock rotation

P7 – Ja

P1 – And the purpose of a use by date?

P4 – it is for you

P5 – To use before

P4 – Ja, It is for you as a consumer

P7 – After that date it means it “off”

P2 – And uhm.. the manufacturer.. If something happens to you and you say it is this product it is at your own risk after this date

P1 – Ok, and why do you use or evaluate a use by date?

P6 – why...?

P1 – Why do you as a consumer use the information; like a use by date

P2 – to evaluate on how fresh the product is

P7 – And like for how long are you going to keep it?

P4 – Look as a sell by date it should leave the store; a use by date is you are the user by that date or you going to have to through it away..

P7 – Because like some people they like bread, they put bread in the defreeze ... they say its ok ...no... no its not....

P2 – because it won't be as fresh. They say you can take it out.

P4 – No but it depends on what you are going to use it for - if you are going to freeze bread, right, and you defrost it and you want to make toast – that's all fine you can do that. Because the bread you are going to use for toasting is any case going to kill some off the stuff want, like it converts the sugars into.. you know..

P2 – In the freezer everyday ... that's bad...

P7 – But people don't buy bread like that – nowadays they buy 4 loafs of bread and they put it in the freezer ... no

P6 – But if you... bread... like after the sell by date it is going to create mould, right... so you just ...

P4 – no no... no mould in the freezer... Mould needs 2things; damp and heat otherwise it will not grow. You can't have mould in the deepfreeze, hey.

P2 – No it cannot. If it is outside, then yes.

P4 - Unless you have moisture and humidity and heat and all of that kind of things ja. Mould cannot grow in Antarctic, in ice water or in freezer or that kind of thing.

P5 – I just want to add something.. The question was why do we check..

P1 – Ja, why do you check? ...

P5 – Maybe just to ... not being ignorant – you have to know what you are eating...

P1 – for safety?

P5 – Ja. Because sometimes you can't just buy and consume.

P3 – Ja I think safety is properly the most important

P5 – Because somehow you come across it

P1- Ok, and does price determine when fresh produce should contain date labelling or not?

P1 – Does price have an impact or determination on date labelling?

P2 – I think it does

P6 – It does

P2 – When the product is closer to or when the price is closer to getting spoiled, they take it down to 50% - this has to leave the shop.

P4 – That is when they are trying to sell it, but price should not be an indication of.. so.. It doesn't mean if I give you something fresh now I ask you to pay R100 for the avocado. And tomorrow I give you an avocado and say okey now its 2days old – pay 50 bucks. They intend to do that, but as long as it is fresh stuff there needs to be a half kilo price you know,

people can't use freshness as "I will charge you more". Quality and freshness isn't something we should pay for by the store, it should be given to you, It is their responsibility to sell you good quality stuff and should not be on price.

P1 – So you say there is a...

P4 – They actually do ...What she is talking about they actually do do that kind of thing.

P6 – They do do that..

P4 – It is like last season goes... now suddenly it is all on sale, it is the same kind of thing. So they will gonna have to through it away or give it to an orphanage or whatever the case may be so they might say.. ja if we sell 2 for 1 people will go and buy it.

P1 – Ok, And do you think non-perishable items should only contain date labelling?

P3 - ... no

P1 – non-perishable

P4 – Like your tin food?

P2 – Like your cereals...

P1 – Ja

P4 – It will actually go off

P3 – Everything should have date labelling – because you will never know if the thing has been sitting there for 5years.

P4 – They say like stuff like bake beans

P3 – You don't want to buy a bottle of tomato sauce that has just happened to be at the back of the shelf or a crate of it got lost in the store room and 3years later they drag it out and now you are the one that is buy it.

P4 – But that's the thing about tin food, like bake beans and things like that; it has an endless shelf life, it does not go off..

P2- If you buy something now 2016..

P3 – It has a date on it, I have thrown tins away that have expired.

P4– Somebody is making money out of it... Because it shouldn't be – before those things get released right, they will pack it on the day and they will send it to the laboratory to be tested and 2days later only ... If we were making baked beans we will pack the baked beans and quarantine that stock and take samples of all the batches and send it away and had to be tested. If it was okay, normally the criteria for the releases are 0 pathogens, micros and all of those kind of things – so therefore the tin food should basically have an endless shelf life.

P3 – But then why do they put a date on it?

P4 – To make them buy more ...

LAUGHTER

P3 – But even bottled food, I buy some imported stuff you know.. Ummm.. and you have to make sure that the stuff that you are buying is going to still make you alive..

P4 – If you going to open it – then it has a shelf life. Not sealed..

P3 - Im talking about... ja ... If it's like a bottle of imported tomatoes you know, then I check the validity of the sell by date, you know... because I know im going to put it in my pantry cupboard and Im not going to use it today.

P4 – If I open it there shouldn't - theirs usually not an endless shelf life

P2 – Yes. If it is unopened you can still keep it for...

P4 – You can keep it for whenever. It's been fully stearylized and most of it's been irradiated and all of those things there should be nothing in there.

P6 – Nontokozo was saying after opening you should use it within the same day

P4 – Then they say... after opening that should go on their. So if you buy a bottle tomatoes there should be an endless shelf life, but the moment you open the tin you can use the half and put the other half in a tuber ware and then it will normally tell you use within 2weeks of opening.

P1- and **should items that are only high in quality contain date labelling? If you compare for instance Woolworths and people that sell fruit on the street.**

P4– it doesn't matter... there should be no discrimination...

P2– People on the street don't do sell by dates, even the cardboard that it comes in has ... they just decant everything...you won't see dates, you just see the quality of the products and you just look at it and you judge with your eyes

P4 – That's the thing with informal things, it's not regulated therefore .. then you have to go back to your own instincts were you look at something and feel it and that kind of thing, before you buy it. But if it is in store they've got systems and they supposed to monitor their stock , so you relying on them just to sell you good stuff. But they guy on the street.. kindly different

P2 – The thing is you go there and you touch it- and you like.. JA ITS GOOD.. to put it back and take the one at the bottom – you leave.. I do it.

LAUGHTER

P2 – Ja.. Like I don't want to take the one Ive touch

P1 – And then, uhmm I think we already mentioned this – should fresh produce that is re-fridgerated contain date labels?

P2 – Yes

P3 – Yes, most definitely

P4– Yes

P1 – Ok, and that's that... Thank you for your time

ADDENDUM H:

LETTER FROM ETHICS COMMITTEE FOR RESEARCH



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Reference Number: EC150518-011

14-Jul-2015

JMM MarxPlenaar
Consumer Science
UNIVERSITY OF PRETORIA

Dear MarxPlenaar,

FACULTY OF NATURAL AND AGRICULTURE SCIENCES COMMITTEE FOR RESEARCH

Your recent application to the > Faculty Of Natural And Agriculture Sciences Committee refers.

1. I hereby wish to inform you that the research project titled *"Food wastage, sustainability and the triple bottom line - A case study of urban households in Gauteng, South Africa"* has been approved by the Committee.

This approval does not imply that the researcher, student or lecturer is relieved of any accountability in terms of the Codes of Research Ethics of the University of Pretoria, if action is taken beyond the approved proposal.

2. According to the regulations, any relevant problem arising from the study or research methodology as well as any amendments or changes, must be brought to the attention of any member of the Faculty Committee who will deal with the matter.
3. The Committee must be notified on completion of the project.

The Committee wishes you every success with the research project.

Prof. Norman Casey
Chair: Faculty of Natural and Agriculture Sciences Committee for Research Ethics
FACULTY OF NATURAL AND AGRICULTURAL SCIENCES

ADDENDUM I:

OBJECTIVE KNOWLEDGE TEST CONTENT (Brucks, 1985:13)

| AREA OF KNOWLEDGE | QUESTION CONTENT |
|------------------------------------|--|
| Terminology | <ul style="list-style-type: none"> Product terms to be matched with correct definitions 'Decoys' (terms not associated with the products tested) |
| Product attributes | <ul style="list-style-type: none"> Critical intrinsic attributes Common attributes (usually present but not critical) 'Decoys' (attributes not associated with the products tested) |
| Criteria for evaluating attributes | <ul style="list-style-type: none"> Product usage situations Product examples to be matched with given situations |
| Attribute co-variation | <ul style="list-style-type: none"> The relationship between the attribute and price 'decoys' (relationship between attributes that don't exist) |

OBJECTIVE KNOWLEDGE TEST CONTENT, Adapted from (Brucks, 1985:13; Veale & Quester, 1994:2110)

| Column 1: Area of knowledge | Column 2: Question content | Column 3: True/False Question (Kosa, <i>et al.</i> , 2007) | Column 4: Answer |
|--|--|--|------------------|
| 1. Terminology (Definition) | What does use by date on fresh produce indicate? | A use by date tells the consumer the last date recommended for safe consumption | TRUE |
| | What does sell by date on fresh produce indicate? | A sell by date tells the store how long the date can be extended on the shelf from that date | FALSE |
| | What does best if used by date on fresh produce indicate? | Best if used by date on fresh produce is used to evaluate if the food is at its highest quality that day. | TRUE |
| 2. Product Attributes | What is the purpose of a sell by date? | The purpose of a sell by date is to tell the store how long the date can be extended on the shelf from that date | FALSE |

| | | | |
|-----------------------------------|--|---|--------------|
| | What is the purpose of a use by date? | The purpose of a use by date is to tell the consumer the last date recommended for safe consumption | TRUE |
| 3. Criteria for evaluation | Why do you use/evaluate use by date on fresh produce? | Use-by date is evaluated by consumers to determine the taste of fresh produce | FALSE |
| 4. Attributes co-variation | Does price determine when fresh produce should contain date label or not? Why/Reason? | Products that are high in price should only contain date labels | FALSE |
| | Do you think non-perishable items should only contain date label? Why / reason? | Products that are non-perishable should contain date labels | FALSE |
| | Should items that are only high in quality contain date label? | Products that are only high in quality and safety should contain date labels | FALSE |
| | Should fresh produce that are refridgerated contain date labels? | Products that are refrigerated should also contain date labels | TRUE |

ADDENDUM J:

DECLARATION OF ORIGINALITY

UNIVERSITY OF PRETORIA

The Department of **CONSUMER SCIENCE** places great emphasis upon integrity and ethical conduct in the preparation of all written work submitted for academic evaluation.

While academic staff teach you about systems of referring and how to avoid plagiarism, you too have a responsibility in this regard. If you are at any stage uncertain as to what is required, you should speak to your lecturer before any written work is submitted.

You are guilty of plagiarism if you copy something from a book, article or website without acknowledging the source and pass it off as your own. In effect you are stealing something that belongs to someone else. This is not only the case when you copy work word-by-word (verbatim), but also when you submit someone else's work in a slightly altered form (paraphrase) or use a line of argument without acknowledging it. You are not allowed to use another student's past written work. You are also not allowed to let anybody copy your work with the intention of passing it off as his/her work.

Students who commit plagiarism will lose all credits obtained in the plagiarised work. The matter may also be referred to the Disciplinary Committee (Students) for a ruling. Plagiarism is regarded as a serious contravention of the University's rules and can lead to expulsion from the University.

The declaration which follows must be appended to all written work submitted while you are a student of the Department of **CHEMICAL ENGINEERING**. No written work will be accepted unless the declaration has been completed and attached.

I (full names) **NATASHKA ROSA VENTER**

Student number **10430424**

Topic of work

MASTERS DISSERTATION (M CONSUMER SCIENCE)

Declaration

1. I understand what plagiarism is and am aware of the University's policy in this regard.
2. I declare that the material handed in (e.g. essay, report, project, assignment, dissertation, thesis, computer programme, etc) is my own original work. Where other people's work has been used (either from a printed source, internet or any other source), this has been properly acknowledged and referenced in accordance with departmental requirements.
3. I have not used another student's past written work to hand in as my own.
4. I have not allowed, and will not allow, anyone to copy my work with the intention of passing it off as his or her own work.

Signature _____