DEPARTMENT OF BUSINESS MANAGEMENT

PERCEPTIONS REGARDING THE WASTE MANAGEMENT HIERARCHY OF FAST FOOD RETAILERS IN NELSON MANDELA BAY

By

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DECLARATION

We Anotidaishe F. Manyangadze (214377075) and Mutsa Magadzo (214379175) hereby confirm that the treatise "PERCEPTIONS REGARDING THE WASTE MANAGEMENT HIERARCHY OF FAST FOOD RETAILERS IN NELSON MANDELA BAY" is our own work. We are the authors of this research study, and for all cases where we have quoted from the work of others or used other individual's ideas or reasoning in this research study, a reference is provided.

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ABSTRACT

South Africa currently faces growth in population and an increase in urban migration. Consequently, the urban population spike has caused an increased burden on waste management facilities that are inadequate to manage the amount of waste produced. This has contributed to the creation of prohibited dumping sites resulting in health threats and environmental hazards. The creation of more affluent clients has influenced the demand for more restaurants and fast food retailers to overcome the problem of long working hours, resulting in limited time for home cooking. The increased amount of fast food retailers could be linked to the increase in the amount of food waste generated. The waste management hierarchy is a concrete approach to circumventing landfills and decreasing the burden on waste management facilities. A limited amount of research could be found on the waste management hierarchy of fast food retailers, especially in Nelson Mandela Bay. The results of this study could be beneficial to local government, fast food retailers and waste managers.

The study seeks to assess perceptions of fast food retailers regarding the waste management hierarchy in Nelson Mandela Bay. These perceptions revolved around waste prevention, re-use, recycling, energy recovery and disposal, the five levels of the waste management hierarchy, ranked from the most preferred to the least preferred method. To achieve the aim of this study, an in-depth literature study and empirical research were undertaken. A self-administered structured questionnaire was completed by 88 owners and managers of fast food retailers within the designated region. The use of descriptive statistics, such as measures of mean, mode, frequency and standard deviation were employed, and results were drawn.

The results revealed fast food retailers have positive perceptions towards waste prevention. They also have negative perceptions of energy recovery due to the lack of facilities. The respondents are neutral with regards to the reuse, recycling and disposal. Further analysis revealed that fast food retailers are aware of the importance and benefits of waste management. Furthermore, the study showed that over 50% of the managers of fast food retailers do not have any tertiary qualifications. Practical guidelines and recommendations are provided to assist fast food retailers regarding each level of the waste management hierarchy. There is a need for educational campaigns to increase waste management awareness amongst fast food retailers and industry stakeholders. The sector needs continual improvement with regards to their waste management practices.

This study has contributed to the knowledge of waste management perceptions in Nelson Mandela Bay. The literature and the empirical investigations explored and illustrated the need for more facilities. Furthermore, this study may be used by the local government and waste management firms to further investigate and improve management of waste in Nelson Mandela Bay.

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INTRODUCTION AND BACKGROUND TO THE STUDY

1. INTRODUCTION AND BACKGROUND

The increase in human population over the years has left the natural environment affected by the growing human activity. The increase in the extraction and manipulation of the resources on earth are overlooked, although it inflicts much more damage on the planet (Butler & Dovers, 2018).

Human development has caused a spike in urban migration, and this migration has seen cities struggling to cope with the amount of waste produced due to the increase in population. Expansion in the workforce, the creation of new middle-class citizens alongside an emerging number of female professionals, has brought noteworthy change in the social structure. A change that has influenced the demand for restaurant and fast food retailers, as more of the population is working for long hours and directly substituting cooking hours with fast food (Elmedulan Jr, Apat & Matunog, 2014).

The fast-food retail business has seen a growth over the years from a more oligopolistic market structure to a more independent market. Established fast-food restaurants have established stiff competition in the industry. Significant supermarkets like Pick n Pay, Checkers and Woolworths are now competing with restaurants and other retailers because of the ready to eat food they offer at their delis (Mhlanga, 2018). The expansion of the commercial food retailers' market has increased the amount of food waste that South Africa produces (Blick, Abidoye & Kirsten, 2018). The Council for Scientific and Industrial Research (CSIR) managed to research the amount of food wasted in South Africa. The research pointed out that an average of 9 to10 million tons of food is wasted per annum (D'Oliveira, 2013). Facilities and programs like landfills, composting, recycling and advanced treatment were adopted in order to have a better waste management system (Zaman, 2015). The increase in waste has depressed the efficiency levels of waste disposal systems.

The waste management hierarchy is a type of waste control that places more significance on the avoidance of waste recycling, reusing or disposing. This waste management hierarchy system does not only focus on dematerialisation and disposal of waste material but also on how to avoid waste (Van Ewijk & Stegemann, 2016). The waste management hierarchy emphasises on ranking the preferred waste control method to the least preferred method. Various groups

of people and institutions use this hierarchy form, but the preferred method differs in accordance with the preferences of the individuals. Despite the different methods used to implement the waste management hierarchy, all schools of thought believe that consumption reduction, the reuse of items and recycling will play a significant role in effectively implementing zero waste (LeBlanc, 2017). Several difficulties influence the effective and efficient control of waste due to the rise in the population and a growing economy which implies that an increased amount of waste is now produced (Department of Environmental Affairs, 2011).

The perceptions of fast food retailers in Nelson Mandela Bay towards the waste management hierarchy will be reviewed in this study.

1.2 PROBLEM STATEMENT

The problem statement of this study is what the views and perceptions of fast food retailers are regarding the waste management hierarchy in Nelson Mandela Bay.

There is an increased burden on waste management facilities, which are inadequate to serve the waste produced by the population. Several prohibited waste dumping sites are developing due to inconsistent collection times, scarcity of formal dumping sites, failure of efficient methods of collecting landfill fees from companies and the public (Department of Environemntal Affairs, 2018). The hierarchy is a concrete approach to circumventing landfills, however there is not enough evidence to show the advantages of the hierarchy concerning reducing environmental impacts and natural resource use (Van Ewijk & Stegemann, 2016). Moreover, purchasers and industry do not ultimately value waste administration expenses. Thus, there is a substantial preference for waste disposal compared to other methods. However, there are very few acceptable and compliant landfills which impede the disposal of all waste in a safe manner (Department of Environemntal Affairs, 2018).

The hierarchy alone will not be adequate to manage waste when the infrastructure available is limited. One of the barriers of recycling is the lack of technology, equipment and awareness. Neglecting to recycle gives rise to the economic problems such as a loss of resources and energy which in turn could negatively impact the profitability of the industry. The current approach to policy, regulation and waste education does not effectively advance and promote the waste management hierarchy at the highest level. Furthermore, it gives limited power to waste managers at the lowest levels (Van Ewijk & Stegemann, 2016). Therefore, stronger

institutions with more strict and specific policies are vital in order to ensure positive results in waste management.

There is a need for improved awareness, strengthened capacity, active participation and a well-structured approach in order to enforce better waste control measures. Additionally, there is a trivialisation of environmental degradation as a result of adopting negligent waste disposal methods which stems from reasons such as ignorance and inadequate waste management education (Oelofse *et al.*, 2018).

There is an insufficient number of studies that have been conducted on fast food retailers in Nelson Mandela Bay and how they prioritise the waste management hierarchy. This study intends to fill in this gap of knowledge. Given the importance of waste management in South Africa, it is vital that fast food retailers understand the significance of waste management hierarchy.

1.3 OBJECTIVES

The study aims to achieve the following objectives:

1.3.1. PRIMARY OBJECTIVE

In line with the problem statement, the primary aim of the study is to assess the perceptions of fast food retailers regarding the waste management hierarchy in Nelson Mandela Bay.

1.3.2 SECONDARY OBJECTIVES

- To establish the levels of waste avoidance, reduction of waste, reuse, recycle, energy recovery, treatment and disposal practised by fast food retailers in Nelson Mandela Bay.
- To establish fast-food retailers' level of awareness towards their current waste management practices and the extent to which they conform to waste management hierarchy.

1.3.3 Methodological Objectives

In order to achieve the primary and secondary objectives mentioned above, the following methodological objectives have been identified:

- To conduct a literature review on the nature and importance of waste management hierarchy amongst fast food retailers.
- To determine the appropriate research methodology to be used in conducting this study.

- To develop an appropriate measuring instrument that will be used to uncover the perceptions of fast food retailers in relation to waste management hierarchy.
- To collect data from a pre-determined sample and statistically analyse the data to uncover the perceptions of fast food retailers.
- To provide conclusions and recommendations based on the findings of this research that could assist fast food retailers in the Nelson Mandela Bay and the Municipality to improve waste management practices.

1.3.4 RESEARCH QUESTIONS

- What are the waste management practices of fast food retailers?
- What are their perceptions regarding the waste management hierarchy?
- Is there a relationship between retailer perceptions and their current waste management practices?

1.4 LITERATURE REVIEW

This section presents the notion of waste management hierarchy, what it consists of and how production of minimal waste can be achieved.

1.4.1 WASTE MANAGEMENT HIERARCHY

Waste management hierarchy is practiced around the world due to the favourable environmental outcomes it provides and the extent to which it utilizes resources efficiently. The hierarchy categorizes various forms of waste in relation to the type of hazard posed by the waste form, the impact it has on the environment and the impact it has on overall human health. The different practices are namely waste prevention, reuse, recycling, incineration and landfills (Zeng, Li, Stevels & Liu, 2013).

In the years 2011 to 2015 in South Australia, waste management hierarchy was listed as a critical framework guiding waste management practices in the region in order to lead them to a zero-waste civilisation (Zero Waste, 2011).

EcoRecycle Victoria was the driving force behind the implementation of waste management hierarchy in industry, government and community programs concerning product waste. Which have seen companies moving away from the old way of disposing of waste to a more efficient measure of resource recovery (Gertsakis & Lewis, 2003).

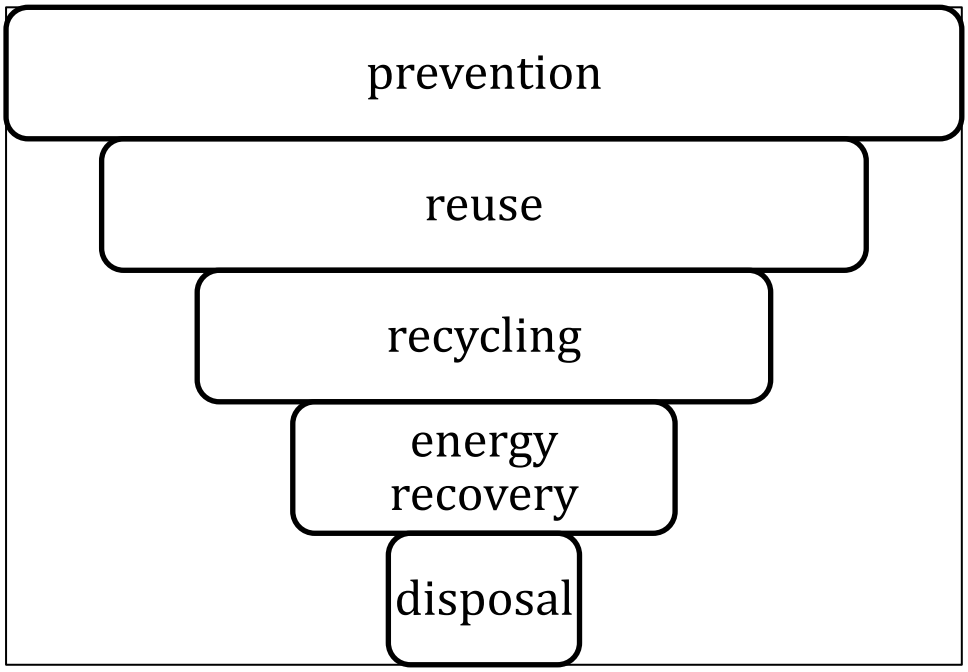
1.4.2 THE DIFFERENT LEVELS OF THE HIERARCHY

This section of the study will focus on the importance of each level on the waste management hierarchy.

Waste management hierarchy is mainly used to determine the importance of how waste should be disposed and treated. The hierarchy is renowned by the scientific studies of life-cycle analysis to have sound advice on how to handle waste relating to the extent of its effects on the environment. In some studies, there is a socio-economic belief that the hierarchy might not be able to give the proper framework on handling waste concerning what society desires. Despite the differences in how the hierarchy guides waste management, both studies agree that waste prevention is generally better than waste disposal (Rasmussen, Vigsø, Ackerman, Porter, Pearce, Dijkgraaf and Vollebergh, 2005).

The reason why both schools agree that waste prevention is better than waste disposal is that prevention decreases the amount of waste generated, this encourages new methods of preventing waste which include the purchase of a durable good or products which are not hazardous to the environment. Consumer attitudes towards products can lead to a decrease in the amount of waste produced. Consumers can start purchasing more durable products, which can be re-used numerous times or even rethinking the design of a product so that it removes other expenses in the production chain (Song, Li & Zeng, 2015).

FIGURE 1 WASTE MANAGEMENT HIERARCHY



Source: (Department of Environmental Affairs, 2018)

Gharfalkar, Court, Campbell, Ali and Hillier, (2015) adopted the use of a pyramid framework illustrating the importance of waste disposal. The most preferred measure is prevention which focuses on changing the manufacturing of products are to a more environmentally friendly production process which takes in fewer resources and does less harm to the environment. Concerning the minimisation measure, it focuses on reducing the number of resources used in production. Another waste management hierarchy measure is recycling that focuses on production processes allowing for reprocessed goods to be reused. In addition to this, adopting the recycling process could be an assistance mechanism in the recoveries of energies. Disposal is the least preferred method which deals with the discarding of waste through different means such as landfills and dumpsites (Ferrari, Gamberini & Ramini, 2016).

Methods of waste have different effects on the environment; this observed when using incineration and landfill, which have a direct impact on the air from the chemicals and pollutants generated from the treatment. Recycling also has environmental effects due to effects coming from transportation, the energy use and other by-products that occur from the process. These methods of waste disposal also harm the environment because of the displacement of energies (Rasmussen *et al.*, 2005).

Waste management hierarchy also has its limitations when it comes to its implementation. Consumers in some instances have a decision to make, and that is to do away with the desire for newness, this directly goes against the measure of reuse or recycling. Feeding this desire for newness can lead to pollution of water, air and the use of more energy to produce new goods that could have been recycled (Song, Li & Zeng, 2015).

One of the significant factors affecting the implementation of the waste management hierarchy is because waste managers have little control over the production of waste. Retailers have different ways of handling this waste.

1.5 WASTE MANAGEMENT METHODS OF FAST FOOD RETAILERS

The following section will discuss and show the waste management practices in the fast-food industry.

1.5.1 DISPOSAL

Improved waste management regulation has encouraged waste recovery rather than the disposing of waste in landfills. The fast-food sector is lagging in the recovery of solid waste

and disposes of most of its solid waste in landfills (Aarnio and Hämäläinen, 2008). Griffin, Sobal and Lyson (2009) state that the US landfilled 72% of the food waste and another study found that 90% of the solid waste produced in South Africa is landfilled (Friedrich & Trois, 2013). Majority of fast food retailers waste is solid, usually from coming from packaging and a large part is avoidable (MacKerron & Hoover, 2015)

1.5.2 RECYCLING

The largest fast-food retail franchises in the world are leading in efforts of using the waste management hierarchy as their waste management strategy. MacDonald's restaurants measured their performance in 12 countries and found out that 29% of their kitchen waste materials, such as cooking oils, polyethene foils, and corrugate or cardboard used in packaging were able to be recycled to make useful resources (McDonalds, 2018). The used cooking oils are recycled to make biodiesel McDonalds states that 40% of its oil goes into biodiesel generation. The growing biodiesel industry in South Africa heavily relies on used oils from the local fast food retailers (Thaba & Mbohwa, 2015). According to the Department of Environmental Affairs (2018), lack of adequate infrastructure is hindering recycling methods in South Africa.

1.5.3 WASTE REDUCTION

In order to reduce waste, restaurants in the fast-food sector now track their food surplus data and past sales to inform their purchasing decisions. Furthermore, this will enable them to minimise the waste by crafting deals with suppliers that best suit their customer volume and collate data that will permit chefs to modify supply specifications (Aarnio and Hämäläinen, 2008). McDonald's states in their corporate report that it works with its staff, farmers and other suppliers to formulate the most efficient methods of production, that will result in the least waste produced.

1.5.4 DONATING SURPLUS FOOD TO THE HOMELESS

There is always going to be waste produced regardless of the measures put in place to eliminate it, and several fast foods retailers partner with local charities, food banks and shelters to ensure that no edible food is thrown away and added to the waste (Griffin *et al.,* 2009). KFC, one of the most popular fast-food franchises in South Africa, has a global policy that instructs on redistribution of unsold chickens to local charities (Sahoo, 2015). Starbucks, with its food share program, aims to do the same by donating 50 million meals per year through their food share program (Addady, 2016).

1.6 RESEARCH DESIGN

Objective s in this study can be captured by dividing the research into two categories. Literature review, which is the secondary research and the empirical review, which is the primary research of the study.

1.6.1 LITERATURE REVIEW

Secondary data is the data that is already available in forms of a researcher-contributed database, journals, internet sources, public or private archives and institutional records as well as government agencies (Smith & Smith Jr, 2008).

The primary objective of the study will be tackled in the literature review using already available data on the waste management hierarchy and how it can be implemented to reach a zero-waste state. In this study, we take a closer look at what the fast-food retailers think about waste and what that perception does to the environment. How fast food retailers manage and dispose of their waste is examined in order to see what kind of effects it has on the environment.

This study will be focusing on the perceptions fast food retailers have towards waste and so how can those perceptions be improved in order to attain zero waste.

1.6.2 EMPIRICAL RESEARCH

This form of research is done by the collection of data by the research and design, knowing the population group, selection of the sample size and analysis of the data collected.

1.6.2.1 Research Design, Paradigm and Methodology

Research paradigms are theoretical lens used by a researcher to assess the methodological facets of their investigation and establish the methods that will be applied as well as how the data obtained will be analysed (Kivunja & Kuyini, 2017). Positivistic research through quantitative research is to be carried out. Qualitative and quantitative approaches are rooted in philosophical traditions with different methodology and general assumptions (Kawulich, 2012). Pure quantitative research relies on the collection of quantitative data, usually in the form of numerical data (Salmon, 2007). This study will be based on quantitative methods.

1.6.2.2 Population, sampling and data collection

The population sampled compromised of all the fast-food retailers in Nelson Mandela Bay. Retailers should be represented well so that a fair chance of selection is observed. Due to the mobility limitations of the researchers, non-probability sampling applied through convenience sampling was used to select a small sample of 100 retailers from all fast food retailers in NMB.

1.6.2.3 Design of the measuring instrument

A questionnaire to collect data was designed in order to harvest the information needed in such a way that reduces flawed answers from the participants. Sections were used to separate the different categories of information to be collected. Section A focuses on General perceptions regarding waste management. Section B identifies Perceptions regarding the waste management hierarchy. Section C focuses on the importance and benefits of waste management with the use of a 5-point ordinal Likert scale to measure responses. Section D collects the participant's Biographical data using the nominal scale.

1.6.2.4 Data analysis

Quantitative researchers believe that reasoning and human conduct is predictable and explainable; this traditionally brought rise to the theory of determinism, which states that every action is determined by several factors (Salmon, 2007). Data captured using an Excel spreadsheet will be analysed utilising the Statistica computer programme. Data analysis techniques which use descriptive statistics such as the mean, standard deviation scores and frequency distributions will also be adopted. More details of the research design will be provided in chapter 3 of this study.

1.7 SCOPE OF STUDY

This study was carried out in a major metropolitan area in the Eastern Cape, specifically Nelson Mandela Bay by two Bcom Honours in Business Management Students in the year 2019. Furthermore, the study intends to focus on fast food retailers operating in the area within the Nelson Mandela Bay. The empirical research is limited geographically owing to ease of access to collect primary data and for the researchers to have the ability to manage the workload and carry out the study successfully. As discussed earlier, fast food retailers are expanding rapidly and contribute a significant portion to the national waste. Given this information, this study will also focus on fast-food retailers perceptions regarding the waste management hierarchy.

1.8 CONTRIBUTION OF STUDY

Previous studies have looked at how waste control can be maximised to reduce the amount of waste disposed of in landfills. This study takes a focus on how waste management hierarchy perceptions of fast food retailers in the Nelson Mandela Bay (NMB) area affect the amount of waste disposed. Retailers can contribute to the minimising of waste disposal using waste prevention as the preferred option in the hierarchy, but also methods like reuse, recycling,

recovery including energy recovery are discussed in detail and so to see how educating the community about this will change their perception towards waste. The research is to benefit the stakeholders of the environment, which is being threatened by the high levels of waste, how to repair waste damages in the environment will also be discussed. Results of his study are to be used to better the perceptions of the fast-food retailers in NMB and so clearly show what can be achieved by the improved perception. This study should be able to provide guidelines to lessen the stress on the waste disposal facilities as well as have a positive influence on the natural environment and so reducing the chances of catching diseases from polluted sources.

1.9 DEFINITIONS OF KEY CONCEPTS

As this study focuses on the waste management hierarchy and fast food retailers' clear definitions of these and related terms are mentioned below

- **Waste:** The South African government terms waste as any substance, whether or not that substance can be reduced, reused, recycled and recovered— that is surplus, unwanted, rejected, discarded, abandoned or disposed of; which the generator has no further use of for production; that must be treated or disposed of (Department of Environmental Affairs, 2011). The Alabama Department Of Environmental Management (2018) defines waste as any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities, including any material to be discarded by a generator. For this study, waste is defined as any undesirable solid, liquid or gaseous substance which is unwanted after primary use.
- **Waste Management:** Waste management may be defined as the discipline associated with the control of generation, storage, collection, transfer, processing and disposal of waste (Mishra & Tiwari, 2013). Marinela (2009) states that in fact, a succession of actions by collecting, transport, processing, recycling and finally of elimination of these. For purposes of this study, waste management can be defined as the management of processes and activities with regards to waste from its inception to its disposal.
- **Waste management hierarchy**: The waste management hierarchy is a concept that promotes waste avoidance ahead of recycling and disposal, reduce, reuse and recycle (Pires, Martinho, Rodrigues & Gomes, 2019). The waste management hierarchy consists

of options for waste management during the lifecycle of waste, arranged in descending order of priority (Department Of Environmental Affairs , 2011). For this study, waste management hierarchy can be defined as a list of priorities of control of waste management that focuses on waste avoidance, reduction, reuse and recycling.

- **Waste Disposal:** Means the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land (Department Of Environmental Affairs , 2011). In this study, disposal will refer to the process of removing, storing or destroying waste.

1.10 STRUCTURE OF STUDY

The structure of the study is as follows:

- Chapter one will be mainly focusing on the introduction mind the brief background of the study. To zone in better on what we will be discussing in the study, we create a problem statement which will discuss what the problem is and why is it the problem. The research objectives also will be highlighted in the first chapter. The methods of how data will be collected to carry out research will be communicated. Methodology and research design will be discussed to show what is required for the research to be successful. The scope and demarcation of the study are also part of the first chapter. Finally, the chapter will list the fundamental concepts of the study and explain the concepts; the contribution of the study is also under chapter one as it describes what to expect from the study.

- Chapter two of the study will look at the literature review, which is thoroughly compiled using journals, books and various articles compiled by numerous researchers. In this chapter, the importance of the waste management hierarchy will be discussed how the adoption of such a process can improve the waste industry in Nelson Mandela Bay. The role of fast food retailers in the bay will be looked at thoroughly and so to come up with solutions on how the retailers can educate its environment on how to dispose of waste properly. The general population, as well as the employees of the retailers, will also be focused on to see the kind of perceptions towards waste do these stakeholders have and how they contribute to the waste. The natural environment is also a significant stakeholder in when it comes to waste and so it should be thoroughly examined to see how much damage the waste has caused and how the waste management hierarchy can control the damage.

- Chapter three is about the research design and methodology, as well as the logic used for the selected methodology. Sampling techniques, sample sizes and the primary data collection method that will be used will be discussed in this chapter. How data analysis will be done is going to be highlighted, and a table will be included, which will be used to analyse the data given.

- Chapter four talks about the findings of the empirical investigation and give an analysis of the data which has been given by respondents from the research conducted.

- Chapter five will provide a brief overview of what has been discussed in the study. Also, an abstract from the main findings of the study should be provided. Due to the findings from both the literature review and the empirical investigation, a conclusion will be provided. Lastly, the contributions and limitations of the study will have explained, and so recommendations will be made concerning the waste management hierarchy.

1.11 TIME FRAME OF STUDY

A proposed detailed schedule of the completion of the study is proposed:

TABLE 1.1 TIME FRAME OF STUDY

DATE	ACTIVITY
Feb- April	Prepare a research proposal and submit
April - May	Prepare literature review and submit the first draft
May 10	Submit Turnitin report and second draft of the literature review
27 May	Submit Proposed research design
August	Submit empirical data
September	Submit chapter on final results
October 14	Submit draft treatise
October 28	Submit final treatise

1.12 SUMMARY

The first chapter provided an overview of the proposed research study. The topic's introduction is presented to recognise the need for conducting a study on the perceptions regarding the waste management hierarchy of fast food retailers in Nelson Mandela Bay. The chapter gave a brief description of the problem statement, research objectives and the methodology have also been

explained which will be covered extensively in chapter three of this study. Lastly, scope of the study, contribution of the study and the definitions of key concepts have been provided and discussed in this chapter.

CHAPTER TWO
LITERATURE REVIEW

2.1 INTRODUCTION

This chapter gives a summary of the arguments made among scholars on the perceptions regarding the waste management hierarchy of fast food retailers. South Africa has been experiencing an expansion of the commercial food retailers' market, which has been directly linked with the increase in the amount of food waste in the country. This section will investigate the waste management hierarchy what it is and how does one achieve the promises of zero waste it aims to deliver if applied well. The researcher will also put his opinion, and a conclusion was made at the end.

2.2 CONCEPT CLARIFICATION OF WASTE

This section will investigate waste management what it is and how does one achieve the promises of zero waste it aims to deliver if applied well.

According to the Department of Environmental Affairs (2011), waste is any substance, whether or not that substance can be reduced, reused, recycled and recovered— that is surplus, unwanted, rejected, discarded, abandoned or disposed of; which the generator has no further use of for production; that must be treated or disposed of (Department Of Environmental Affairs, 2011). The Alabama Department of Environmental Management (2018) defines waste as any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities, including any material to be discarded by a generator. For this study, waste can be defined as any undesirable solid, liquid or gaseous substance which is unwanted after primary use.

Waste management hierarchy is a concept that promotes waste avoidance ahead of recycling and disposal. It comes from the idea of reducing waste first then reuse and then recycle (Hultman & Corvellec, 2012). Waste management hierarchy is applied around the world due to the favourable environmental outcomes and resource utilisation it produces. The hierarchy has a way it grades the various forms of waste depending on the hazard the form of waste has on the environment and general human health. The different practices namely are waste

prevention, reuse, recycling, incineration and landfills(Department of Environmental Affairs, 2018; Godfrey & Oelofse, 2017).

2.3 BACKGROUND INFORMATION ON WASTE MANAGEMENT

Management of waste is a concept which is continuously developing in South Africa. Throughout the history of waste management in South Africa, it has been managed by various legislation which was governed by different departments in the government. The departments were perceived as passive resulting in poor waste management practices. A key milestone is the waste legislation had been through the promulgation of the waste act (Act No 59 of 2008) which was introduced on 1 July 2009.

This policy's mandate is to set the common goals and understanding of how South African waste should be managed. The waste Act adopted the waste management hierarchy approach in order to address waste issues in the country. Waste management hierarchy emphasised on waste reduction, if not possible reuse, recycling and decomposing, recovery to create energy, with disposal in landfills as the last option (Godfrey & Oelofse, 2017).

The waste act could be the driving force behind the implementation of the waste management hierarchy in industry, government and community programs concerning product waste. Furthermore, this has seen companies moving away from the old way of disposing of waste to a more efficient measure of resource recovery; however, the strong legislation makes the smaller companies less competitive (Gertsakis & Lewis, 2003).

The development of an integrated waste management plan was a requirement for all government spheres responsible for waste management in terms of national environmental management. The government had to plan and manage waste through the waste Act 2008 properly; Act No.59 of 2008. The waste act had guidelines that were meant to be followed in the waste handling process following the management hierarchy (Department of Environmental Affairs, 2018).

Moreover, this implies that integrated waste management plans should include all aspects of the waste management hierarchy. It is recommended that when the IWMP is developed it must include and describe the population and development policies of the area it services, description of services that are provided or that are available for collection, minimization, reuse, recycling

and recovery, treatment and disposal of waste and finally, IWMP must include the number of persons in that area not receiving waste collection service (The Presidency, 2009)**.**

According to (NMBM, 2016) municipal good practices of waste management depend on the following:

- Dedicated and well-motivated employees.
- Functional integrated process
- Supported political stability
- Financial management and procurement
- Senior managers and councillors should have a good understanding of waste management
- Giving rewards to compete with waste management managers

In 2005 the first IWMP in NMB was completed, and it covered the period from 2005 -2010. The Swedish International Development Cooperation Agency (SIDA) drafted the advice and funding. There was a decrease in the percentage of households not receiving waste removal in the NMB area from 3.1% to 2.2 % from (2001-2011). On a more national level, the percentage of households receiving no waste removal was higher in the national average than in the NMB area. There was a drop from 86.1% in 2001 to 82.9% in 2011 on the percentage of households receiving weekly refuse collection services. Basic level of refuse collection is provided to 99% of the household, according to the 2011-2015 IDP (NMBM, 2016).

The increase in the number of the middle class has seen cultural shifts and transitions in dietary preference on a more global scale. Additionally, this has resulted in the increase of food waste in most countries including South Africa (Popkin, Adair & Ng, 2012). The unemployment rate in NMBM has decreased from 36.6% in 2011 since the previous census in 2001, where unemployment was recorded at 46.4% (NMBM, 2016). It is stated that besides the US and China with evidence of carbon print, food waste could have been a third country. 28% to 36% of the food produced in the world is wasted (HLPE, 2014). In developing nations, it constitutes the majority of the poorest classes of people. Therefore, food waste in this region is an economic loss. It is estimated that 1 billion people in this world suffer chronically due to hunger while 1/3 of the food purchased by consumers is wasted (WRAP, 2009). It therefore, indicates the need for reduction in food waste. Reuse and disposal are other efficient methods of waste management if the food cannot be reduced at source (Rushton, Croucher & Baker, 2014)

The effect of food waste has suggestions for the general population, the planet, and benefits; these correspond with three measurements that acclimate the Triple Bottom Line which is perceived as a system that catches the pith of maintainability (Aschemann-Witzel, de Hooge & Normann, 2016). All around the globe, roughly 1.3 billion tons of waste assigned for human utilisation is either lost and additionally squandered (FAO, 2013). Food waste happens at various phases of the value chain, in high salary nations this is for the most part toward the end, interestingly with low-pay nations where it occurs toward the start (Betz, Buchli, Göbel & Müller, 2015).

2.4 THE DIFFERENT LEVELS OF THE HIERARCHY

Waste management hierarchy is mainly used to determine the importance of how waste should be disposed of and treated. The hierarchy is renowned by the scientific studies of life-cycle analysis to have sound advice on how to handle waste in relation to the extent of its effects on the environment. Other studies, mainly socio-economic, believe that the hierarchy might not be able to give the proper framework on handling waste concerning what society desires. Despite the differences in how the hierarchy guides waste management, both studies agree that waste prevention is generally better than waste disposal (Rasmussen *et al.*, 2005).

The reason why both schools agree that waste prevention is better than waste disposal is that prevention decreases the amount of waste generated. Figure 2.1 illustrates the different levels of the hierarchy in order of the most preferred to the least preferred method.

Consequently, this brings about new methods of preventing waste like the purchase of a durable good or products which are not hazardous to the environment. Consumer attitudes towards products can lead to a decrease in the amount of waste. Consumers can start purchasing more durable products, which can be used numerous times or even rethinking the design of a product so that it removes other expenses in the production chain (Song, Li & Zeng, 2015)

According to a study by (Ferrari *et al.*, 2016), the most preferred measure focused on changing how products are made to a more environment-friendly product which takes in fewer resources and does less harm to the environment also delivering a satisfactory service. Therefore, resource use reduction can be classified as waste prevention.

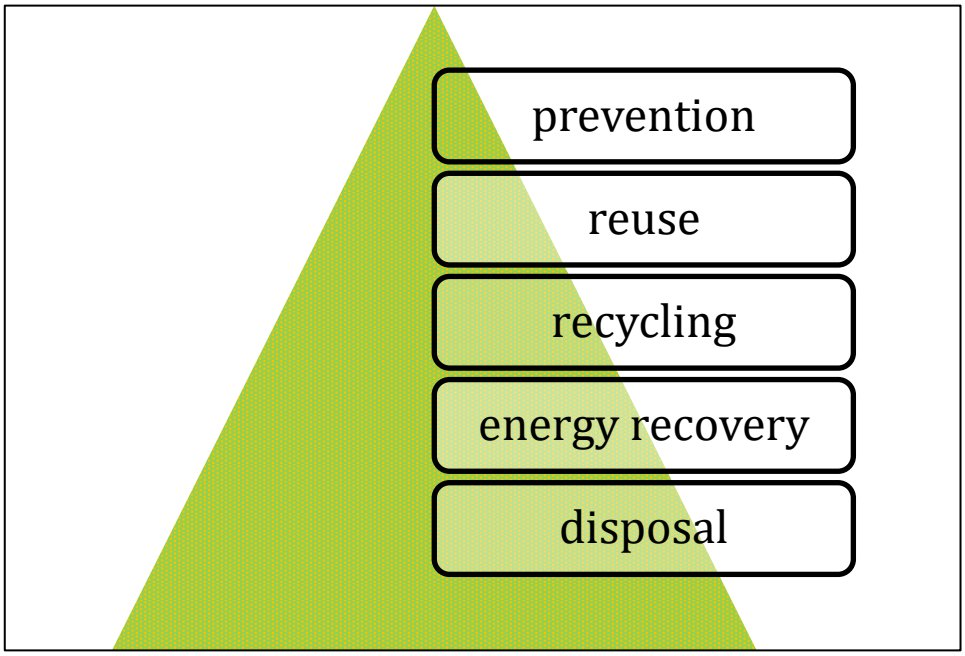


FIGURE 2.1 WASTE MANAGEMENT HIERARCHY

Adopted from (Department of Environmental Affairs, 2018)

2.4.1 WASTE PREVENTION / MINIMIZATION

As illustrated in figure 2.1, the most preferred measure is prevention. Prevention links with the minimisation measure, it focuses on reducing the number of resources used in production. This should be the priority of any business. Food loss is viewed as a waste fraction that should receive the highest priority regarding promoting waste prevention (Sakai, Yano, Hirai, Asari, Yanagawa, Matsuda, Yoshida, Yamada, Kajiwara, Suzuki & Kunisue, 2017).

There are three steps identified that aid in achieving food waste prevention for food retailers, asses needs, minimise impact and ordering in bulk (Recycle Track System, 2019). In order to reduce waste, restaurants in the fast-food sector now track their food surplus data and past sales to inform their purchasing decisions. Thus, this will enable them to minimise the waste by crafting deals with suppliers that best suit their customer volume and collate data that will permit chefs to modify supply specifications (Aarnio & Hämäläinen, 2008). McDonald's (2018) states in their corporate report that it works with its staff, farmers and other suppliers to formulate the most efficient methods of production that will result in the least waste produced. This stage in the hierarchy does not deal with the waste, it focuses more on the production resources, and the number of outputs to achieve the most preferred method of the hierarchy.

However, achieving zero waste has to compensate for local deficiencies. A study by Ferrari *et al.*, (2016) recommended that developing countries should not prioritise waste prevention in

the short run and focus on strengthened their waste management and awareness of waste management.

2.4.2 RE-USE

Figure 2.1 shows that the next favoured method is the re-use of waste. Materials can be used for several reasons; their use can be changed if there have reached their lifespan and can act as raw materials for other goods (Pajula, Behm, Vatanen and Saarivuo (2017), sometimes referred to as their secondary purpose. In the instance of the food industry, specific rules and regulations should be followed and some food might be found to be non-compliant due to aesthetic or functional standard but will still edible. This food can be used for a different purpose that is not fast food and reduces the contribution to food waste (Neff, Kanter & Vandevijvere, 2015). Restaurants in developed countries incorporate efficient use of materials by procuring products and services that are designed for reuse (Pajula *et al.*, 2017).

Inevitably, waste is produced regardless of the measures put in place to eliminate it and several fast foods retailers' partner with local charities, food banks and shelters to ensure that no edible food is thrown away and add to the waste (Griffin *et al.*, 2009). Reusing products for the same purpose on the resale market is another method of reuse (Sitra, 2015). KFC, one of the most popular fast-food franchises in South Africa, has a global policy that encourages the redistribution of unsold chicken to local charities (Sahoo, 2014). Starbucks, with its food share program, aims to do the same by donating 50 million meals per year through their food share program (Addady, 2016). Food would be wasted if not distributed to charitable programs, materials have a life cycle and cannot be used forever (Pajula et al., 2017) which links to the next section on recycling.

2.4.3 RECYCLING

Recycling involves separating materials from the waste stream and processing them as products or raw materials. It discards the cradle to grave approach and has a cradle to cradle approach which forms the fundamentals of waste management hierarchy (Department of Environmental Affairs, 2018). The process is when manufactures start thinking of the recycling process at the design stage, which preserves materials as resources to aid with recycling in the last stages of its life cycle (Wautelet, 2018). In turn, this allows the materials to stay in a closed loop in the technical cycle and increasing in quality by becoming technical nutrients to aid in upcycling (Wautelet, 2018).

The biological process is used as a model for manufacturing consumer goods and views all materials as nutrients removing the concept of waste and incorporates the natural processes of biological metabolism (Wautelet, 2018). If the waste is not manufactured, organic waste is repurposed and make use of their secondary purpose (Recycle Track System, 2019).

One of the issues faced by the NMB municipality is that there are limited recycling facilities in the metro, a large sum of investment is required to develop the structures vital for recycling, and the NMBM's budget is not enough for developing such services (NMBM, 2016). Troschinetz and Mihelcic (2009) identified government funding as a barrier to the development of recycling in developing countries leading to limited recycling facilities. The same study also identified that the education of the waste management personnel in developing countries is another limiting factor to the development of recycling in developing countries. Therefore, this might lead to fast food retailers not employing recycling as one of their waste management measures. According to the Department of Environmental Affairs (2018), lack of adequate infrastructure is hindering recycling methods in South Africa.

The largest fast-food retail franchises in the world are leading in efforts of using recycling in their waste management strategy. MacDonald's restaurants measured their performance in 12 countries and found out that 29% of their kitchen waste materials, such as cooking oils, polyethene foils, and corrugate or cardboard used in packaging were able to be recycled to make useful resources (McDonald's, 2018). The used cooking oils are recycled to make biodiesel McDonald's states that 40% of its oil goes into biodiesel generation. The growing biodiesel industry in South Africa heavily relies on used oils from the local fast food retailers (Thaba & Mbohwa, 2015).

2.4.4. ENERGY RECOVERY

Waste, in some instances, can be used as fuel by reclaiming certain materials and components. The Presidency (2009) defines recovery as the controlled extraction of a material or the retrieval of energy from waste to product. Energy recovery is also defined as the conversion of non-recyclable waste materials into usable heat, electricity, or fuel through a variety of processes, including combustion, gasification, pyritization, anaerobic digestion and landfill gas recovery. (Kaplan, Decarolis & Thorneloe, 2009). For this study, energy recovery will be defined as the controlled conversion of waste to energy. Only a small portion of waste materials can be used this way. In figure 2.1, energy recovery ranks below recycling on the hierarchy but above disposal.

A common method of waste to energy is incineration;

"Incineration is a process where organic substances are oxidised understand extreme heat (excess of 8500C and converts into CO2 and water vapour which is released into the atmosphere from the chimney stack after flue gas treatment. This type of process has been used dating back to the early 1900s to generate electricity from waste as well as utilising the heat for district heating and recently district cooling" (Moodley, Parkin & Nhlengetwa, 2015)

Municipal solid waste conversion to energy contributes approximately 14% of non-hydro renewable electricity generated in the United States(Kaplan *et al.*, 2009). A feasibility study by (Royal HaskoningDHV, 2014) reported that Nelson Mandela Metropolitan Municipality could generate 50 MW of electrical power per day by incinerating around 2,200 tons of waste per day. Accordingly, this will produce 0.5–0.7 MWh/t of waste. However, the NMBM does not have any waste energy recovery plant or an incinerator, the municipality used to undertake small scale incineration of medical waste at some medical facilities, but that has closed due to poor performance (NMBM, 2016).

There has been concern over the possible hazard to human health that can be a consequence of the emission of chemicals produced by the incineration method; several of these emitted chemicals are the root to several unfavourable health effects (National Research Council, 2000). Nevertheless, noteworthy developments in emission regulations have occurred, firm regulations have been put in place concerning the emission of dangerous chemicals (SEA, 2017).

Durban and Johannesburg municipalities have started projects to recover some of the landfilled waste into energy. However, waste to energy recovery is still in its infancy in South Africa and is not a preferred or popular method. Its difficulty in implementing can encourage landfilling as a preferred method of waste management (Department of Environmental Affairs, 2018; NMBM, 2016).

2.4.5. DISPOSAL

The last resort when dealing with waste disposal, is throwing it on to land, often referred to as landfilling. The department of Environmental Affairs (2011) states that this method of waste management is the most popular way of dealing with waste in South Africa. As stated in figure 2.2, disposal is the least preferred on the hierarchy. Disposal means the burial, deposit, discharge, abandoning, dumping, placing or release of any waste into, or onto, any land

Landfills use three classification factors, the operation and location of these are dependent to the closeness of the site to geographical factors such as hydrography, geology, distance from human settlement. Additionally, landfills are classified according to their size. Finally, the water balance at the site is the 3rd level of classification (Bhailall, 2016). Despite the increase in recycling and reuse efforts, the rate of landfilling is still high, with 90% of the waste generated in South Africa sent to landfills (Statistics South Africa, 2012; Godfrey and Oelofse, 2017). There are a limited number of landfills facilities in South Africa, and only 26% of the 581 sites are licensed (Pienaar & Howard, 2014).

Moreover, beyond these compliance issues faced by landfilling in South Africa, the estimated remaining life of landfilling airspace in the major municipalities is rapidly decreasing with Cape Town and Johannesburg with 5 and 8 years remaining respectively (Department of Environmental Affairs, 2018). The space shortage is one of the reasons why disposal is ranked the least preferred on the hierarchy. Above and beyond the limited space, landfills are unpleasant due to their harmful effects on the air and water quality (Godfrey & Oelofse, 2017). However, landfilling remains as the chosen method of dealing with waste owing to the low costs involved, compared to the other waste management methods (Bhailall, 2016).

Waste management regulation has improved, the legislation encourages waste recovery instead of disposing of it in landfills. The fast-food sector is lagging in the recovery of solid waste and disposes of most of its solid waste in landfills (Aarnio & Hämäläinen, 2008). Griffin *et al*., (2009) state that 72% of the food waste in the US was landfilled and 90% of the solid waste produced in South Africa is a land filled (Friedrich & Trois, 2013). Majority of fast food retailers waste is solid, usually from coming from packaging and a large part is avoidable. (MacKerron & Hoover, 2015).

2.5 REASONS TO REDUCE FOOD WASTE

Linking with the previous section, there is a need to reduce the waste sent by fast-food retailers to landfills. (Bagherzadeh, Inamura & Jeong,2014) stipulates that there are three viewpoints which can be adopted to verify the reasons to reduce waste

- Ethics and food security
- Environmental impact
- Minimisation of costs

2.5.1. FOOD SECURITY

Food security means that the resources which could have been allowed to the production of this food are minimised for example labour, land and capital. Although there is no direct relationship between the reduction of food waste and gaining of the poor and hungry, it is still evident that it freezes up land, water and biological resources. Bagderzadeh *et al.*, (2014) mention that counties in more need of food could benefit from food security.

The ethical culture of not wasting food had been developed in many nations due to the history of famine and poverty. Advisory bodies like WRAP have supported the movement for waste reduction, which might also affect food security for the better. Encouragement of consumers and the industry powers to minimise their waste by using more accurate best before dates to ensure nothing is disposed of before it is stale. Consumers are advised to make use of fewer food portions, and an increased food preservation culture should be developed, this is also believed to help consumers combat health problems like obesity (Lin, Huang & Wahlqvist, 2009).

2.5.2. ENVIRONMENTAL IMPACTS

Production of food has resulted in the depletion of natural resources, for example, land and water and responsible for the emission of dangerous chemicals (FAO, 2013). Another author argues that it was resources inefficient to cut food waste. The report mentioned that food supplies would replenish and would require the use of additional resources, which might override benefits. The argument drawn is that even though cutting food waste was an important idea at some point, it no longer became efficient.

The environmental impacts caused by food waste through greenhouse gas emission increases the chances of suffering from food insecurity (Jereme, 2017). The reason is that without proper environmental conditions it is difficult to grow to produce due to some changes in weather patterns also this might influence the rise of natural disasters which might further destroy the means of production and even worse endanger human lives.

The by-products of waste include some landfill gasses that contaminant the air quality and create bad odour which makes it unpleasant to the people in surrounding areas(Njoku, Edokpayi & Odiyo, 2019). One of the most prominent landfill gasses is methane (CH_4) (Bhailall, 2016). CH_4 is a potent greenhouse gas which is one of the greatest contributing to global warming and climate change, and it traps 20 times more heat than carbon dioxide ($CO_{2)}$ (Bhailall, 2016; Danthurebandara, Passel, Nelen, Tielemans &Van Acker, 2013).

Methods of waste management have different effects on the environment; this is seen using incineration and landfill which have a direct impact on the air and chemical generated pollution generated from the treatment. Recycling also has environmental effects through effects coming from transportation, the energy use and other by-products that occur from the process. At the same time, these methods of waste disposal also have a positive effect on the environment because of the displacement of energy done by the energy produced from incineration (Rasmussen *et al.*, 2005).

2.5.3. MINIMIZATION OF COSTS

Linking with the previous section, good business practices include a balanced assessment of their social, environmental and economic impact (Arowoshegbe & Emmanuel, 2016). The following section discusses the economic factor that is cost minimisation.

Dietary transition is another the increase in food waste since people are moving from the natural starchy staples (i.e. potatoes and grains) to more perishable kinds of foods and high calorie that use mostly natural resources and minimise costs. When discussing the food industry and waste management not only should the health hazards be looked at but also issues of economic cost are to be considered too. The production of food factors in costs and so different methods are used which are deemed cost-effective for the current generation, but at the same time what can be deemed efficient by one generation could not be the same for future generations. Also minimising costs related to food production will not be futile if it will not affect the future generation positively (Lin *et al*, 2009).

One of the significant factors affecting the implementation of the waste management hierarchy is because waste managers have little control over the production of waste. Retailers have different ways of handling this waste. Proper stock management has positive impacts on waste prevention as well as reducing operating costs (Recycle Track Systems - RTS, 2019; Oluwaseyi, Onifade & Odeyinka, 2017)

2.6 LEGAL ASPECTS

Procedures and policies which are designed by the government are the documented standards which an organisation should follow (Golja & Nizic, 2010). The main aim of policies and procedures are to act as guidelines to the employers and employees bin how to effectively complete tasks.

Procedures and policies aim to increase the level of efficiency and also laid down the foundation for organisational expectations on employees (Moule & Giavara, 1995). According to the Gauteng Provincial Integrated Waste Management Policy (GPIWMP), it states that dangerous industrial waste, especially food waste, requires responsible transport, handling, storage, treatment and proper disposal.

Waste disposal management facilities and practices are encouraged on-site. Also, GPIWMP suggests that organisations which follow management best practices need to be given incentives while those who do not follow best practices must be given penalties. The waste hierarchy would be applied as a component of waste management strategy concerning all the industries concerned (South Africa Department of Environmental Affairs, 2018). Lack of waste data has been primarily attributed as the significant reason hindering the implementation of waste management policies in South Africa (Fiehn, Ball & Novella, 2005). The higher an organisation steps into the waste hierarchy, the more chances of benefiting from government incentives. Therefore, this reduces the need for landfill space, and it is environmentally sustainable.

2.7 CHALLENGES IMPACTING WASTE MANAGEMENT

Different countries have different rules when it comes to food waste. Different intentions lead to different government's rules. Other governments support food waste reduction and others critically increasing food waste. Most food regulations in most countries were centred on population health and food safety rather than decreasing food waste (Bagherzadeh *et al.,* 2014). Several factors are impacting the success of proper waste management.

2.7.1 AWARENESS AND EDUCATION

The level of awareness amongst management is not satisfactory and has often caused mismanagement. There is a need for waste management specialists or consultants. Furthermore, there are not enough waste management awareness campaigns (Gumbi, 2015).

2.7.2 SEPARATION OF WASTE

There are not enough recycling setups which allow separation of waste at source and rerouting of waste streams to facilities that will buy back or recover the waste (Department of Environmental Affairs, 2018). The NMBM initiates no household separation of waste, residents of the city have to send their waste to the nearest recycling drop off point (Royal HaskoningDHV, 2014). Point toward difficulties in recycling or repurposing due to the absence

of separation of waste is a major contributing factor to why South Africa is lagging in the levels recycling compared to developed countries(Godfrey & Oelofse, 2017).

2.7.3 FINANCIAL

The alternative options of waste treatment of management cost more than landfilling, and the lack of financial incentive is another challenge in waste management (Department of Environmental Affairs, 2011). The government funding is not sufficient for municipalities to provide adequate waste management services in their respective geographical locations which have led to the informal sector taking the lead in waste management in South Africa (Godfrey & Oelofse, 2017).

The weak financial position of the municipalities should encourage them to seek partnership with the private sector so that they can at least provide satisfactory waste management.

2.7.4 POLICY

The department of environmental affairs also mentioned that the policy and regulatory framework does not aggressively encourage the waste management hierarchy, (Godfrey & Oelofse, 2017) states that the environment created is not conducive for waste reuse, recycling and recovery activities. The implementation of these activities is now only subject to extensive legislative requirements. The author argues that the legal definition of waste, is a protection-based definition, and it is thought-out to stifle initiatives that encourage the waste management hierarchy. Furthermore, it has stifled the possible economic revenue that the waste management sector can contribute. The waste management sector can create jobs and have a significant impact on GDP if allowed to develop more (Department of Environmental Affairs, 2018).

2.8 BEHAVIORAL PATTERNS RELATING TO THE PERCEPTIONS OF FOOD WASTE

The portion size of the food offered can be used to determine the amount of food waste in the foodservice providers industry. The strategy or the culture of apportioning the right portions in relation to the customer needs can be a real strategy to avoid food waste (Sundt, 2012).

Restaurants should provide the right with graded prices. Restaurants should also carry out a survey and discover which type of food tends to be leftover by clients; this will help the restaurant to modify their dishes (Lipinski, Hanson, Waite, Searchinger, Lomax & Kitinoja, 2013).

Another factor which can contribute to practices and behavioural to food waste is habits. Habitual in food waste implies that the behaviours are being initiated with less conscious thoughts than it was previously done before. The employees or stuff that deals with food waste need to be well motivated in order to produce efficient results. According to Berry, Beatty and Klesges (1985), they argued that customers tend to order more food than they can finish. The Chef is responsible for the planning and procurement in order to reduce the unpredictability of consumption.

This is possible since the Chef will be aware of the eating habits of his customers. Failure by the Chef to give an exact pattern of their customers will lead to over-ordering of food, order to the less preference of customers, therefore, leading to losses in the organisation. The author suggested that restaurants must use research techniques in order to gain an improved understanding of where food waste comes from. Some of the methods which could be implemented are questionnaires, focus groups, and ethnographic studies. This will help in food waste management since the managers get accurate eating patterns of the clients (Quested, Marsh, Stunell & Parry, 2013)

The managers can also effectively delegate stuff for the right roles, increasing efficiency, profits, and reducing food waste. Another author cited that there was no clear, distinct relationship between behaviour and resulting in food waste. Customers taste for food varies; therefore, the factors which encourage them to lower their amount of food also vary (Quested *et al.,* 2013). One other aspect of reducing food waste is guilt. Guilt triggered customers not to waste food; therefore, result in a reduction of food waste (Quested *et al*., 2013). Therefore, only implying the sole plan to reduce food waste using environmental concerns does not have a real impact on the cause (Ross, 2015)

2.9 OTHER USES OF WASTE

The waste can be used for other useful things like biogas technology. When waste is turned into biogas, it will be an environmentally good source of energy which promotes sustainability. Biological conversion and thermo-chemical technologies are options for waste to energy technologies (Wang, Wang & Shahbazi, 2015).

The majority of African people's lives can change dramatically due to the use of unutilized energy in Africa. Africa has different and abundant energy resources which are yet to be utilised. The introduction of biogas has become another important source for providing clean

energy to the society of Africa and is believed to reduce poverty. Biogas is a product of industrial waste, agriculture waste or human waste. Although there are no clear statistics on the use and demand for energy use in Eastern and Southern Africa, it is evident that the demand for biogas energy is on the rise (Karekezi, 2002).

Biomass as basically wood-fuel and charcoal are the predominant energy source utilised in sub-Saharan Africa. The utilisation of waste to create biogas not just restricted to the loss from nature, for example, agrarian waste, nourishment waste, or steers compost; yet can likewise human waste can also be of importance and can be utilised. The utilisation of food waste for biogas age considered gainful either in terms of procedure or condition. It is in the meantime produce energy and lessening natural issue that brought about by unmanaged human excreta transfer. Biogas technology is gaining popularity in the market, particularly in governments where they advance biogas frameworks.

2.10 SUMMARY

This chapter summarised the arguments laid down by different authors about the perception regarding the waste management hierarchy on fast food retailers in Nelson Mandela Bay. The chapter gave a brief background and introduction of waste management in South Africa. Thereafter the five levels of the waste management hierarchy (prevention, reuse, recycling, energy recovery and disposal were ranked in order of preference. Subsequently, the different levels where further explained and discussed in relation to the fast-food retailers in NMB. It illustrated that as much as there is progress is being made landfilling is still the most favoured option on the waste management hierarchy due to its lower costs in comparison to the other options.

Additionally, this chapter investigated three reasons to reduce food waste, namely, Food security, environmental impacts and cost minimisation. It explored the harm that landfill causes to the environment with its CH_4 emissions which contribute to global warming and climate change. This chapter also explored the state of waste management and the legal aspects that businesses should consider with regards to waste management in South Africa.

The challenges presented showed that there is a need for improved awareness, strengthened capacity and legislation which will allow for a conducive environment to practice waste management of the waste management. Finally, the chapter highlighted other uses of waste.

The next chapter will look at the research methods and instruments that will be compared to the literature and will be used to come up with recommendations and solutions.

CHAPTER 3
RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

Chapter 2 of this study provided an overview of the waste management hierarchy. The chapter observed the different methods fast food retailers use to manage the waste that they generate. The previous chapter highlighted the behavioural patterns of the respondents relating to the perceptions of food waste, mainly in the fast-food sector.

This study aims to provide a detailed understanding of how fast food retailers view the waste management hierarchy and investigate how they can improve their waste management practices being in line with the hierarchy.

This chapter will focus on the research design and methodology to be followed during this study. The aim is to achieve the second and third methodological objectives of this study. Furthermore, a detailed explanation of primary and secondary data collection will be provided. The data analysis method will be discussed, and a summary to conclude the chapter.

3.2 RESEARCH PARADIGM AND METHODOLOGY

This section will give an in-depth overview and discussion of the research paradigm selected and the methodology of the study.

3.2.1 RESEARCH PARADIGM

Research paradigms can be viewed as a theoretical lens used by a researcher to assess the methodological facets of their investigation and establish the methods that will be applied as well as how the data obtained will be analysed (Kivunja and Kuyini, 2017). There are many philosophical paradigms in existence today due to the advancement in the human way of thinking and diverse ways of explaining the existence and implications of the phenomena existing in the world (Adom, Yeboah & Ankrah, 2016). As mentioned in the first chapter, the research will be guided by the assumptions, principles, norms and values of the chosen paradigm. Ontology and epistemology are two defining elements of a paradigm. While ontology examines the nature of reality, epistemology is concerned with the nature of knowledge and its acquisition, and within them, several possibilities exist which couple to form a paradigm (Burrell & Morgan, 2017; Ormston, Spencer, Barnard & Snape, 2014). The most

popular research paradigm is positivism since it was the first to be coined and is heavily reliant on science and facts (Bogdan & Biklen, 2003).

With positivism, knowledge is believed to be quantifiable and objective; this objectivity is based on the belief that reality can be separated from the individuals that observe it. Positivistic principles are mainly guided by realism, suggesting that there is no effect without a cause. Thus, their truth is guided by accurate observations and measurements that are verifiable. Positivist researchers are not trying to create reality or interpret it, but they are more focused on discovering it (Chilisa & Kawulich, 2012; Peng & Shiyu, 2019).

The research paradigm influences the fundamental aspects of a study and can be linked with certain methodologies. Measurable and quantifiable data inform positivism it makes use of quantitative research methodology (Chilisa & Kawulich, 2012). Hence, for the purposes of this study, the positivist paradigm will be the most appropriate since it is more suited to quantitative methods of data collection. In order to deal with the large sample size of 80, we need to adopt the positivist method for it is the best at ensuring that the data being provided by the respondents is reliable and consistent considering the large sample size.

3.2.2. METHODOLOGY

Research methodology is defined to solve the research problem (Kothari 2004) systematically. Furthermore, Kothari (2004) states that it is understood to be a science of studying how research is done scientifically by studying the different steps that are used by a researcher and the logic behind using them to study the research problem.

Research can either be qualitative or quantitative, and in some cases, it can employ both methods (Ellis & Levy, 2009). Qualitative and quantitative approaches are rooted in philosophical traditions with different methodology and abstract assumptions (Kawulich, 2012). A qualitative approach will be more appropriate in a scenario where the sample is small, while its outcomes cannot be measured and quantified and more useful in cases of social inquiry (Denzin & Lincoln, 2008). The qualitative method collects and analyses data qualitatively and primarily from pictures, words or objects (Nassaji, 2015).

3.3 DATA COLLECTION

The collection of data is to be done first in the research process. First stage of research is plagued with problems of how to collect the data which the researchers should analyse in order

to come up with the necessary information. This is largely influenced by the method of data collection which was adopted. Researchers should be wary of real-time problems which might be faced during this data collection process (Rimando, Brace, Namageyo-Funa, Parr, Sealy, Davis, Martinez & Christiana, 2015).

Data collection is made up of different methods which are techniques and ways of gathering information needed for the research. Information can be collected with the use of questionnaires, focus groups, test, observations and secondary data (Johnson & Turner, 2003). Successful data collection includes identifying the environment in which research is to be carried out, the actual data collection process, validity of the collection process as well as the data collected and lastly the accurate interpretation of the data (Perlis, Sayward & Shaw, 1981). All this will be discussed in this chapter on how the data collection process can be carried out and in ways that will satisfy all the criteria.

3.3.1 SECONDARY DATA

Secondary data refers to the information that is readily available for the researcher to use. This information is collected from sources which are publicly available even though they might not have been published. When collecting secondary data, the best-known version of the data is found under the major government surveys like census, agriculture and statistics about the living standards of the population (Clark, 2013)

When collecting secondary data some challenges might be faced as restrictions are present to protect the intellectual property of other scholars. The initial source of the data will be cited by the researchers collecting secondary data, and in some cases the scholars cited are to be contacted and made aware of the use of their work (Hox & Boeije, 2005).

Secondary data is an investigation to identify what previous researchers have written on the topic, this enables researchers to focus on areas of their topic which have not been covered. Secondary data is flexible and so it can be used in many other different ways such as an empirical exercise with procedures and steps as witnessed in the collection and evaluation of primary data (Doolan & Froelicher, 2009).

This study will be looking at collecting secondary data from the various credible internet journals, web documents and textbooks which are in support of the waste management hierarchy research.

3.3.2 PRIMARY DATA

This is data collected for the sole purpose of gaining information on how to solve the research problem being faced. Effectively as primary research is being carried on, the information being collected is being added into the already existing pool of social knowledge made easily accessible using the internet and libraries. This new data can be used for comparative research, teaching and learning and from asking fresh questions about the areas not addressed by the other writers (Hox & Boeije, 2005).

3.3.2.1 Population, sample frame and Sample

Kothari (2004), states that the research population refers to all the elements that are in the field of inquiry and must be clearly defined. The population is also defined as a segment of items a researcher targets and focuses on in order to collect data (Bless, Higson-Smith & Kagee, 2006). Additionally, a population can be finite or infinite, when there is a finite population the number of the population can determined (Kothari, 2004). Therefore, in this study, the population is all fast food retailers in the Nelson Mandela Bay.

A Sampling Frame is the list, index, or records from which the sample will be drawn (Dattalo, 2008). This study will, therefore, have no sample frame since there is not a pre-existing list of all the fast-food retailers that are in the Nelson Mandela Bay available to use.

The study will not use the whole population but will draw up a sample in which interpretations and analysis can be made. The result can be viewed as a generalised depiction and portrayal of all the elements in the field of inquiry (Peterson & Merunka, 2014). With reference to Bryman and Bell (2018) a sample is a portion of the population that is selected for the research to conclude the entire population. Consequently, for this research study, a sample size of a minimum of eighty (80) fast food outlets will be selected in the Nelson Mandela Bay. Having assessed the lack of ability to access all fast food retailers, a sample size of 80 will suffice for the purpose of this study. The sampling techniques will be discussed in the section that follows.

3.3.2.2 Sampling Technique

Principally, sampling techniques can be classified into two groups either probability sampling or non-probability sampling. Probability sampling is that everyone in the population has an equal chance of being selected in the study by following a set of rules that ensures each unit of the population has a known probability of being selected. The choices are also independent of one another. On the other hand ,non-probability sampling means one cannot generalise beyond the sample since this sampling technique does not include any set of rules which can aid the

estimation of the probability of each element in the population to be included in the sample (Kothari, 2004; Acharya, Prakash, Saxena & Nigam, 2013). Table 3.1 summarises the advantages and disadvantages of the two techniques.

This study will adopt a non-probability sampling technique due to the convenience and inexpensiveness of the method. The sample population will be found in the Nelson Mandela Bay, and so fast food outlets will be selected according to how convenient are they to access for the researchers. There are several non-probability sampling techniques available for researchers to use. Subjects will be chosen because how close and accessible they are to the researcher, this is making use of a non-probability sampling technique referred to as a convenience sampling (Etikan, Musa & Alkassim, 2016)

TABLE 3.1 ADVANTAGES AND DISADVANTAGES OF PROBABILITY AND NON-PROBABILITY SAMPLING

Probability Sampling	Non-Probability Sampling
ADVANTAGES: ● absence of selection bias ● suitable to establish what a set of people think ● corroborate what has been established from other sources ● Make inferences of a larger population's decision	ADVANTAGES: ● inclusion of important political actors ● suitable to establish what a set of people think ● corroborate what has been established from other sources ● Convenient, relatively inexpensive
DISADVANTAGES: ● risk of omitting important respondents through chance	DISADVANTAGES: ● greater scope for selection bias ● limited potential to generalise to the wider population

Source adapted from (Tansey, 2007).

3.3.3 MEASURING INSTRUMENT

This research will be carried out using a self-administered structured questionnaire which will have a five-point Likert scale to measure the respondent’s responses. This questionnaire will have questions which will be mainly based on the waste management hierarchy of the fast-food outlets in Nelson Mandela Bay. The layout of the questionnaire will be done in four sections A, B, C and D. Section A focuses on the general perceptions regarding waste management, Section B is focused on the perceptions of the different stages of the waste management

hierarchy of the fast food retailers , Section C focuses on the Importance and benefits of waste management and lastly Section D takes down the bio graphics of the respondents.

The use of open ended and closed ended questions to acquire the best suitable information on the research problem will be included. In order to identify what an open-ended question is and a close ended question differences must be explained between the two. Open ended questions are questions which are asked in order to get an in-depth view of the topic for one to understand the processes taken by the respondents and also observe the potential causes of the problems faced (Weller, Vickers, Bernard, Blackburn, Borgatti, Gravlee & Johnson, 2018). This has allowed the researchers to focus on the choice and use of the words given by the participants and to identify themes using the participants' words. This has been particularly helpful in understanding what it is to which participants are referring and exactly what they are meaning.

When it comes to closed ended questions, researchers believe that they do not contain the same adventurous, more in depth answer an open-ended question would present. Closed ended questions are guided since they are presented to the respondent with a possible set of answers and so limiting the responses (Zikmund, Babin, Car & Griffin, 2003). The use of closed ended questions also makes it easier and less time consuming when processing the data collected by the researcher. Also closed ended questions make it easier to compare data collected due to their nature of revealing the relationship between the variables (Bryman & Bell, 2011). Closed questions are presented with a set of possible answers which should be both mutually exclusive and exhaustive meaning no different responses can be marginalised into another meaning (Lavrakas, 2008).

3.4 DATA ANALYSIS

The data will be entered in Microsoft Excel and then transferred to a statistical program named statistica, and further analysis will take place. Data analysis is the process when the researcher breaks down the data collected into a summarised form so for it to make sense of it. In this process, data is organised, summarised and categorised in order to identify the patterns and themes represented by the data collected (Kawulich, 2004). Data analysis is thought to be the central part of qualitative research, and so it largely determines the outcome of the research (Flick, 2013). This research data analysis will be taking a quantitative approach by using statistical measures of inquiry. Appropriate methods of analysing the data will be adopted, such as the use of Cronbach's alpha, to determine the reliability of the data and check the validity

using the Exploratory factor analysis. The statistical methods improve the reliability of the measuring instrument (questionnaire) by distinguishing inappropriate items that can then be removed from the scale (Yu & Richardson, 2015). They also are used to measure the internal consistency so the test can have trustworthy results.

3.5 PILOT STUDY

The researchers will conduct a pilot study through the distribution of 5 self-administered questionnaires among potential respondents in order to determine whether the questionnaire is understandable and effective. It is an important stage one of the important stages in the research project as it will help recognise the is potential problem areas in the research instruments before the implementation of the full study

3.6 VALIDITY AND RELIABILITY

For the data collected to be considered valid it depends on the ability it has to measure the required outcomes in the research (Bolarinwa, 2015). Valid data is to prove the actual values and exact meaning of the information collected by the researcher (Kelly, Fitzsimons & Baker, 2016). Reliability, on the other hand, looks at the rate at which the data collected can be replicated. Reliability goes hand in hand with validity, but it does not necessarily mean that when the data has been successfully replicated the data collected is valid (Bolarinwa, 2015). Although the reliability of some instances cannot be replicated due to the changes in different factors like age, preferences and influence from different factors. This is so because human behaviour is not consistently the same (Kelly *et al., 2016)*

3.7 ETHICAL CONSIDERATIONS

The study will follow a rigid procedure that will ensure satisfactory ethical standards throughout the study. Participation in this study is purely voluntary, and respondents can choose to withdraw from this study at any point of the study. The respondents right to autonomy is protected by informed consent. Informed consent suggests that the researchers will provide enough information and assurances about taking part in the study. This will allow the respondents to be fully informed on the implications of participation and they can freely decide without any form of pressure or coercion (Bryman & Bell, 2018). The confidentiality and anonymity of the respondents will be respected as well as their privacy. Private information

gathered will be shared with or withheld from others at the respondent's request. All communication regarding the study will be done with honesty and transparency.

3.8 SUMMARY

This chapter focused on the research design and methodology to be followed during this study. The positivistic paradigm was chosen for this study, and it will follow a quantitative approach. Secondary Data was collected from previously written literature, internet sources and journals. In addition, a questionnaire will be used to gather primary data from all the fast food retailers in Nelson Mandela Bay. The questionnaire will be self-administered by the researchers.

This chapter also provides an overview and an explanation of the ethical considerations to be considered when doing this study. The data collected will use convenience sampling, a non-probability sampling technique chosen for their affordability and accessibility benefits. A population of all the fast-food restaurants and sample size of (88) fast food retailers in the NMB. An explanation on how data will be gathered into an excel spreadsheet and analysed using a program called statistica. Furthermore, the data will be tested for validity and reliability using a pilot study descriptive statistic is also provided in this chapter.

The next chapter will focus on the empirical findings where there will be analysed and presented in a way that follows the research design showing its practicality.

CHAPTER FOUR
EMPIRICAL FINDINGS

4.1 INTRODUCTION

The previous chapters have dealt with the theoretical overview of the general perceptions regarding the waste management hierarchy of fast food retailers in NMB and the data collection and analysis methods that apply to this study.

This chapter will analyse the primary data collected. It will focus on the results concerning perceptions regarding the waste management hierarchy of fast food retailers in NMB.

This chapter reports on the response rates achieved for this study. After that, a summary of the respondents' demographic information (Section D) will be discussed and presented. Subsequently, the results of section A, Section B and Section C will be discussed. The chapter will conclude with a brief summary of the main findings of the empirical study consisting of all the sections from the measuring instrument.

4.2 DATA CAPTURING AND RESPONSE RATE

The questionnaires were distributed to 100 restaurants in NMB. Of the 100 questionnaires distributed, 89 were returned to the researchers. 88 of the questionnaires were usable for statistical purposes. The data in the questionnaires was captured in Microsoft Excel and subsequently exported to a statistica, an advanced analytical program. Descriptions of the demographic information of the respondents will be shown in the following section. The data was collected using a 5-point Likert scale which was measured from 1 to 5. 1 was represented by strongly disagree, two is disagree, 3 indicates a neutral response while 4 and 5 represent agree and strongly agree respectfully.

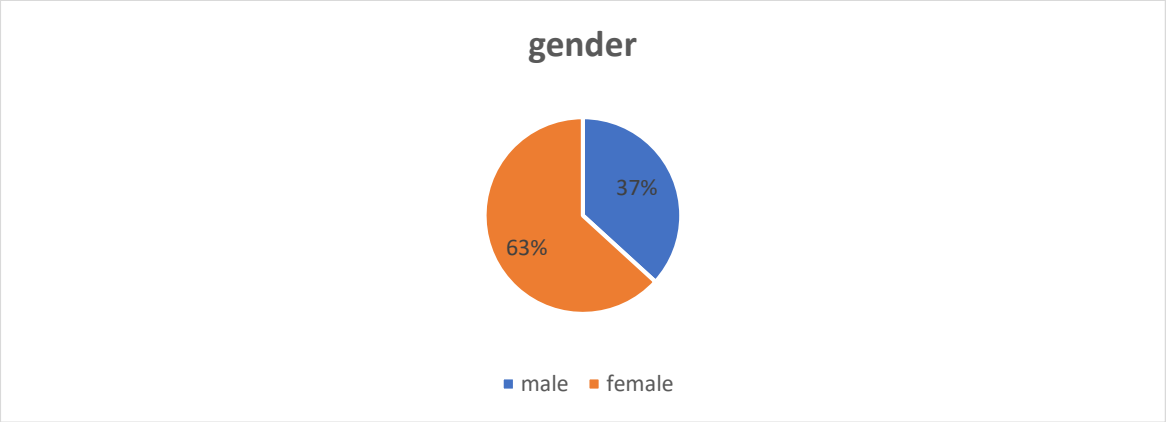
4.3 RESULTS OF BIOGRAPHICAL INFORMATION

Section D of the questionnaire requested biographical information from various respondents.

4.3.1. GENDER

Figure 4.1 below depicts the frequency of the gender. The majority where female consisting of 63% and the remaining 37% is were female.

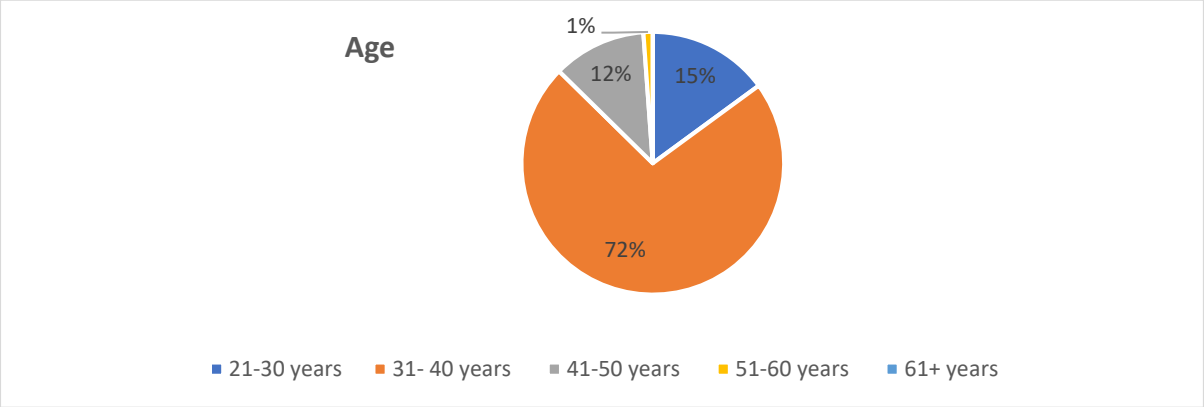
FIGURE 4.1 GENDER OF RESPONDENTS



4.3.2. AGE

Figure 4.2 shows the age of the respondents. A total of 15% of the respondents wherein the age category of 21-30 years, 72% represented the 31-40 years age group, 11% were in the 41-50 years category and the 51-60 years category was only represented by 1% of the respondents. Therefore, most of the respondents were between the age of 31 and 40 years.

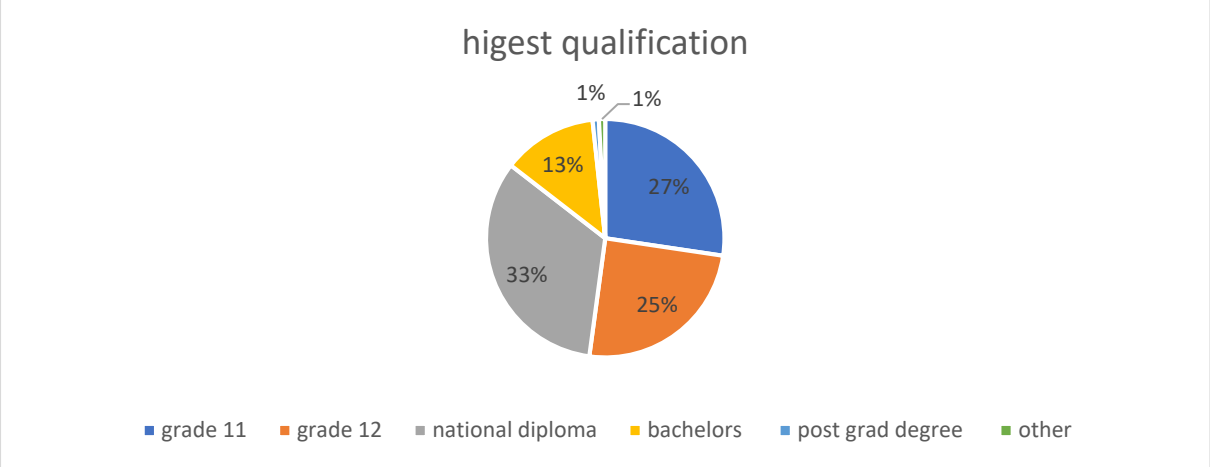
FIGURE 4.2 AGE OF RESPONDENTS



4.3.3 HIGHEST QUALIFICATION

A total of 27% of the respondents were in the grade 11 category ,25% state grade 12 as their highest qualification, 33% fall into the national diploma category, 13 % have obtained a bachelor's degree, and 1% each represented both postgraduate and another category. Many of the respondents have achieved either a national certificate or a diploma.

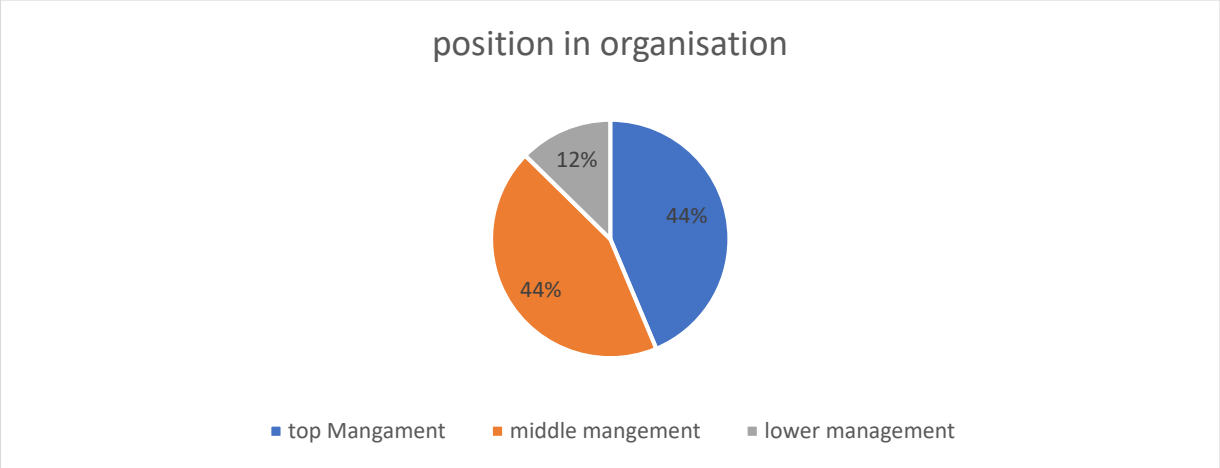
FIGURE 4.3 HIGHEST QUALIFICATION



4.3.4. POSITION IN ORGANIZATION

Figure 4.4 indicates the position the respondents hold in the company. Top Management and middle management are represented by 44% of the respondents each, and the remaining 12 were lower managers.

FIGURE 4.4 POSITION IN ORGANIZATION

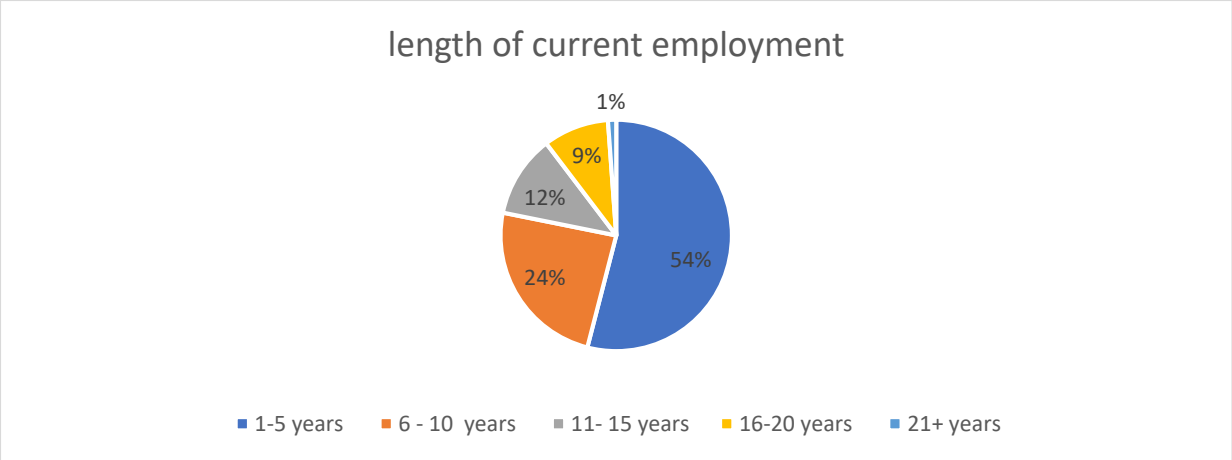


4.3.5 LENGTH OF EMPLOYMENT

Figure 4.5 shows how long the respondents have been employed at the current restaurant. 54% have been employed for 5 years or less, 24% represented the 1-6 years category,11-15 years category was represented by 11%, 9% stated that they have been employed between 16 and 20

years and the remaining 1% represents the 21+ years category. Therefore, most of the respondents have been employed for 5 years or less.

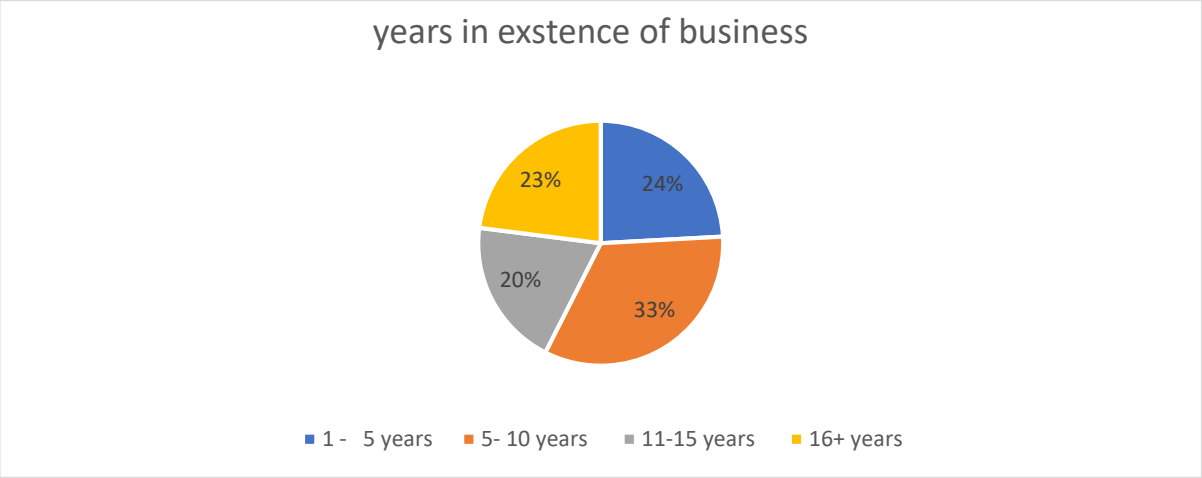
FIGURE 4.5 LENGTH OF CURRENT EMPLOYMENT



4.3.6. YEARS OF EXISTENCE

Figure 4.6 shows the years the business has been operating. A total of 24% represents the 1-5 years category, 33% represents the 5- 10 years category, 20% represents the 11 to 15 years category and the remaining 23% have operated for more than 23 years. Thus, the largest category is the 5-10 years.

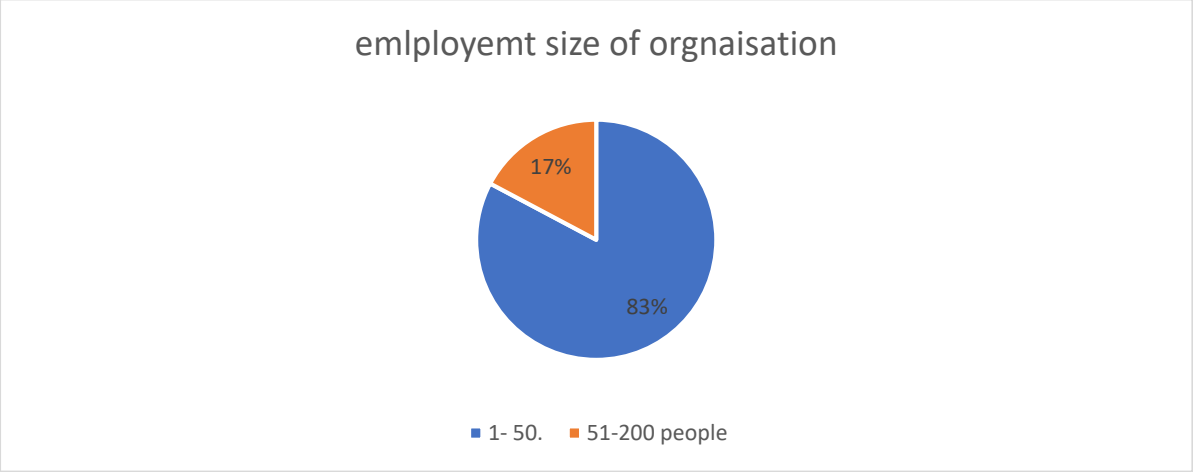
TABLE 4.6 YEARS OF EXISTENCE



4.3.7. SIZE OF ORGANIZATION

Figure 4.7 indicates the number of employees employed at the respondent's restaurant. 83 % employ between 1 and 50 employees and 17% employs between 51-200 works. Most of the restaurants employ between 1 and 50 workers.

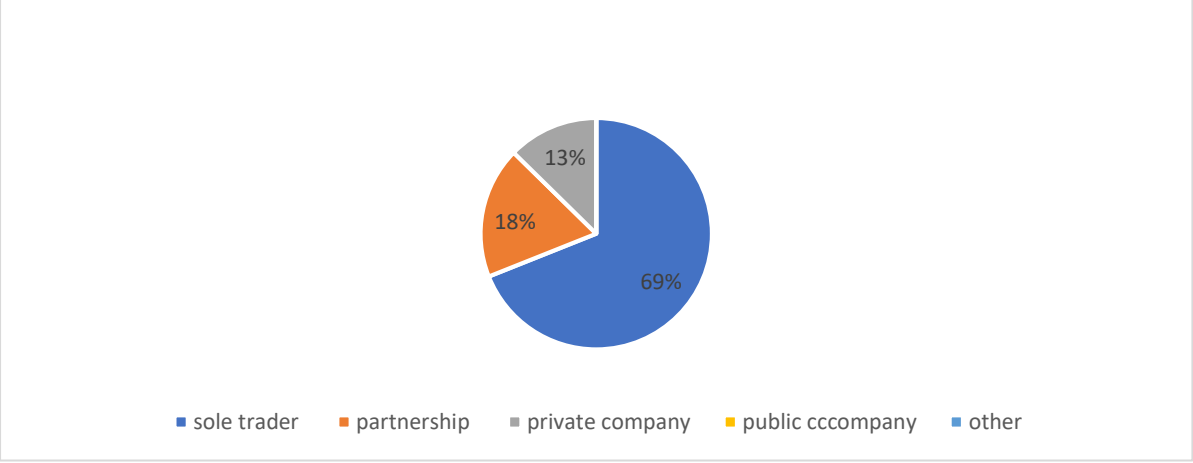
FIGURE 4.6 EMPLOYMENT SIZE OF ORGANIZATION



4.3.8 FORM OF OWNERSHIP

Figure 4.8 describes the form of ownership of the respondents' current restaurant. Sole traders consist of 69% of the respondent's answer, 18% of the restaurants are registered as partnerships and the remaining 13% operate as private companies. Therefore, the most frequent form of ownership is a sole trader.

FIGURE 4.7 FORM OF OWNERSHIP



4.4 GENERAL PERCEPTIONS REGARDING WASTE MANAGEMENT IN THE ORGANIZATION

This Section will be analysing the general perceptions regarding waste management in the organization in relation to the various respondents who managed to answer the questionnaire.

4.4.1 DESCRIPTION STATISTICS REGARDING SECTION A DATA

Table 4.1 has recorded data on how to measure the responses given by the restaurants. The mode, frequency of mode and the standard deviation are accompanied with descriptive statistical figures which shows how the respondents related to the questions. The standard deviation when it is below one it means that the respondents had the similar responses and on the other hand, a standard deviation above 1 indicates that there was a great dispersion of responses.

TABLE 4.1 DESCRIPTIVE STATS REGARDING GENERAL PERCEPTIONS ON WASTE MANAGEMENT

Variables	Mean	Mode	Frequency of mode	Standard dev
A1	4.034483	4	48	0.672522
A2	3.965517	4	46	0.784268
A3	3.367816	3	39	0.836868
A4	3.908046	4	35	1.116808
A5	3.827586	4	40	0.765641
A6	3.337209	4	42	0.820480
A7	3.790698	4	38	0.768747
A8	3.425287	4	39	0.709277
A9	3.873563	4	44	0.832544
A10	3.885057	4	31	0.957532
Overall	3.741526	4	40.2	0.826469

The data collected from the respondents, showed an overall mean of 3.74 for responses regarding how the respondents perceive waste management. An overall of 3.74 falls in the neutral response range but also skewed to a 4, which indicates agreement towards the questions. Hence it can be derived that the respondents had an idea on what waste management is, although more can be done to educate the respondents about the subject. The overall mode recorded was a 4, meaning that the most common answer from the respondents was a 4 indicating that restaurants have an informed background about the matter of waste

management. A standard deviation of 0.82 measures the dispersion the data amongst the respondents and it is seen that the general responses given were clustered in one area proving that there is a consensus on the issue. From the data collected in this section, the first statement (A1) stating "my organisation uses various waste management practices" had the highest mean, frequency of mode and the lowest standard deviation. Statement (A1) had the most responses that agreed with the statement and the lowest standard deviation that shows us how there was little dispersion of answers. Statement (A3) which inquired if the organisation is satisfied with how the local municipality handles waste indicates that the respondents are not entirely pleased with the waste collection. This is seen by the common occurrence of a neutral response shown by the mode (3) also a low standard deviation (0.836868) depicting a clustered response on a single answer maybe indicating how the service is not efficient enough to maintain the same standards across Nelson Mandela Bay.

4.5 PERCEPTIONS REGARDING WASTE MANAGEMENT HIERARCHY OF FAST FOOD RETAILERS.

The following Section B is relating to perceptions regarding the waste management hierarchy of fast food retailers. For the purposes of this study, the Statements in section B have been grouped for them to be analysed in a more effective way. Statement B1-B10 represent Waste Prevention, B11-B15 represent Reuse, B16-B20 represent recycling, B21-B25 represents energy recovery and B26-B30 represent Disposal. The descriptive statistics will be presented by summary tables indicating the mean, the mode, and the standard deviation. Low standard deviation scores below 1 indicate the data points tend to be close to the mean of the set and higher scores, that is scores above 1, indicate that the data points are spread out over a wider range of values. The section will conclude with a summary of the data analysed in section B after analysing the subsections.

4.5.1 DESCRIPTION STATISTICS REGARDING WASTE PREVENTION

The table below shows a summary of descriptive statistics of statement B1 to B10 relating to waste prevention.

The overall mean of statements B1 to B10 is 4.031034 which indicates that the respondents agree with statements. The mode is 4 which indicates that most respondents agree with statements present in section B1 to B10. The standard deviation scores 0.884192 illustrates the data points aren't spread out very wide. Statement B3 scored the lowest mean of 3.586207 and

40% of the respondents were neutral to the statement “My organization is committed to sponsor waste reduction campaigns”.

TABLE 4.2 DESCRIPTIVE STATS REGARDING WASTE PREVENTION

Questions	Mean	Mode	Frequency of mode	Std dev
B1	3.896552	4	34	0.940491
B2	4.172414	4	38	0.878779
B3	3.586207	3	34	0.909277
B4	4.183908	4	41	0.707579
B5	4.022989	4	35	0.777249
B6	4.252874	5	39	0.810087
B7	3.620690	3	31	1.014332
B8	3.908046	4	29	0.897441
B9	4.367816	5	43	0.717148
B10	4.298851	5	43	0.794091
Overall	4.031034	4		0.884192

Respondents were also neutral with the statement B7, thus being “My organization changes menus in order to minimize the quality and quantity of leftovers” indicating that most restaurants do not use this is a method of waste prevention. The questions in this section that received the highest mean scores with 50% of the respondents strongly agreeing to statement B9 and B10 which corresponds with the literature that food retailers buy bulk items with stable shelf life and they strive to prevent over-purchasing of a necessary product and materials (Recycle Track Systems , 2019). Overall, retailers have a positive perception of waste prevention.

4.5.2. DESCRIPTION STATISTICS REGARDING REUSE

Following table shows descriptive stats in relation to reuse and repurposing in the waste management. In section B statements B11- B15 relate to reuse.

These statements achieved a mean score of 3.505747 which suggests that most respondents have neutral perceptions regarding reusing and repurposing products. However, this section has a standard deviation of 1.062143 which is greater than 1 indicating that the data values are spread out over a broader range of values. This is supported by the section’s mode of 4 a suggesting that most scores agreed with the statements in this section. Statement B13 which

states that “My organisation encourages customers to bring their own reusable containers or bags to put food in” has the lowest mean (2.896552) and a mode of 3.

TABLE 4.3 DESCRIPTIVE STATS REGARDING REUSE

questions	mean	mode	frequency of mode	Std Dev
b11	3.528736	4	41	0.887105
b12	3.137931	3	40	1.024949
b13	2.896552	3	29	1.089426
b14	3.586207	4	42	0.909277
b15	4.379310	5	44	0.750835
overall	3.505747	4		1.062134

This mean is spread wide from the highest mean score of (4.37931) where 50% of the respondents strongly agreed with the statement that their organizations use laminated menus instead of paper that could be used many times and the statement scored a low standard deviation of 0.750835 showing that there is general trend with regards to this practice.

4.5.3 DESCRIPTION STATISTICS REGARDING RECYCLING

The table below illustrates the descriptive statistics of the section.

The overall mean of statements B16-B20 is 3.38908, and a standard deviation of 1.096376 was calculated to the subsection with regards to recycling. Most of the statements delivered different individual means compared to the overall mean of the section. With the lowest individual mean (2.908046) being on statement B17 which states that “Uses waste for other purposes (such as Irrigation)”, this is supported by the report by NMBB (2016) that states that recycling is not common in NMB. The highest mean being (4.080460) is represented by statement B20 which states that “Gives customers a carry-out box to take edible leftovers to be consumed at a later stage” and most restaurants agreed to use recyclable products in packaging.

The general perceptions regarding recycling in the waste management hierarchy of fast food retailers in NMB are neutral there is a wide range of views as depicted by standard deviation that is above 1. This is supported in the literature that the lack of infrastructure makes recycling difficult for organizations in South Africa (Department of Environmental Affairs 2018; Godfrey & Oelofse 2017; NMBM 2016).

TABLE 4.4 DESCRIPTIVE STATS REGARDING RECYCLING

questions	mean	mode	frequency of mode	Std Dev
b16	3.839080	4	34	0.790548
b17	2.908046	3	28	1.127172
b18	3.068966	4	30	1.128830
b19	3.022989	3	31	0.964208
b20	4.080460	4	37	0.905004
Overall	3.383908	4		1.096376

4.5.4 DESCRIPTION STATISTICS REGARDING ENERGY RECOVERY

The table below shows descriptive statistics of subsection B21-B25 which has statements connected to energy recovery. This subsection received a mean score of 2.581609 and a standard deviation of 0.996376. Therefore, suggesting that the respondents disagreed with this statement 47% of the respondents had a score of 2 thus disagreeing with this statement B 22 which states that "My organisation creates thermal waste to energy by burning trash (incarnation)." This data is significant to the literature, the report by the Nelson Mandela Metropolitan Municipality states that poor performance of the incinerator led to the project being stopped and it did not extend to food retailers (NMBM, 2016). Fast food retailers in the NMB have negative perceptions regarding Energy recovery of waste. However, question B24 scored a high standard deviation (1.171136) with 20% of the respondents with a score that's agreeing or strongly agreeing with creating biofuel. The overall mean is relevant to the literature that states that energy recovery is not a popular method in South African waste management (Department of Environmental Affairs, 2018).

TABLE 4.5 DESCRIPTIVE STATS REGARDING ENERGY RECOVERY

questions	mean	mode	frequency of mode	Std Dev
b21	2.873563	2	26	1.054388
b22	2.402299	2	41	0.841645
b23	2.413793	2	36	0.909277
b24	2.643678	2	30	1.171136
b25	2.574713	3	34	0.922990
Overall	2.581609	2		0.996376

4.5.5 DESCRIPTION STATISTICS REGARDING DISPOSAL

The final subsection in section B consist of statements B26 to B30 subsection on disposal. A mean score of 3.645977 was achieved and scored a low standard deviation of 0.943801. The statement with the highest mean 4.022989 statements is dirty which suggests that restaurants dispose of cooking oils and fats by collecting them in a jar tab or other container that can be thrown away this statement scored a mode of 5 with 32 respondents strongly agreeing with the statement. 55% of the respondents had a score of 4 on question statement B26 which means they agreed with the statement "My organisation strives to minimise the amount of waste sent to landfills." This can relate to the literature stating that landfilling is the least preferred method of waste management, the South African government also encourages minimizing waste sent to landfills and has laws in place to encourage the practising of the waste management hierarchy (The Presidency, 2009) and according to the data collected the restaurants agree with this. Table 4.6 Descriptive stats regarding disposal

questions	mean	mode	frequency of mode	Std Dev
b26	3.701149	4	48	0.794091
b27	3.402299	3	43	0.813545
b28	3.183908	3	33	0.970839
b29	3.919540	4	48	0.955016
b30	4.022989	5	32	0.927324
Overall	3.645977	4		0.943801

55% of the respondents also agreed by scoring a 4 on statement B29 "separates spoiled foods by acting fast to deal with any food that is spoiled or that will go bad quickly." The mean score of 3.645977 suggests that the food retailers have neutral perceptions regarding the disposal of waste in the NMB.

4.5.6 SUMMARY OF DESCRIPTION STATISTICS REGARDING SECTION B

The table below illustrates a summary of the overall descriptive stats of section B, statements B1-B30.

TABLE 4.7 DESCRIPTIVE STATS REGARDING SECTION B

Statement	Mean	Mode	Std.Dev.
Overall	3.529885	4	1.096523

The overall mean for statement B1-B30 is 3.529885 and scored a standard deviation of 1.096523. The mean achieved indicates that the data lies within the Neutral range. However, the mode of 4 indicates that most respondents tended to Agree with the Statements present in Section B. The standard deviation of 1.096523 shows that the data points are spread out over a wide range of values. Statement B15 achieved the highest mean of 4.379310 and a mode of 5 suggesting that most of the respondents strongly agreed with this statement. Statement B22 has the lowest mean of 2.402299 and a mode of 2 suggesting that most of the respondents disagreed with this Statement and is found under the Energy Recovery subsection.

The waste prevention subsection has the highest mean of 4.031034, and a standard deviation of 0.88 suggests that the respondents agreed with the statements. The lowest mean 2.581609 and mode (2) was represented in the energy recovery subsection, which suggests that fast food retailers negative towards energy recovery and agree with the literature that waste prevention is the most preferred method of waste management.

4.6 DESCRIPTIVE STATISTICS REGARDING IMPORTANCE AND BENEFITS OF WASTE MANAGEMENT

This section of the study shows how the respondents answered the questions concerning the importance and benefits of taking part in waste management. The statistical data in use will be the mean, mode and standard deviation. The mean will indicate to which extreme does the respondent agree or disagree starting from 1 being strongly disagree up to 5 representing strongly agree. The mode will indicate the most frequent response amongst the respondents, whilst the standard deviation will describe how the responses to the questions are dispersed or clustered, with a figure less than 1 being clustered and a standard deviation above 1 represents a dispersion of responses.

This section has an overall mean of 3.9 which is found under the neutral response, although this shows that the respondents answers were more skewed to 4 which represents an agreeing answer. This proves that respondents are aware of the importance and benefits of the waste management but in order to have an improved response some of the respondents should be educated on this matter.

The overall mode of the section is a 4 which shows that the most common response was a 4 indicating that most of the respondents agreed to these statements. A minority of the respondents showed a lack of knowledge on this matter and so are responsible for the reduction

of the overall mean of the section. Overall standard deviation is at 0.86 which indicates that most of the responses were the same and so were clustered together. This also shows a general agreement across the industry of why waste management is a benefit and important to the business and the surrounding community and stakeholders.

TABLE 4.8 DESCRIPTIVE STATS REGARDING IMPORTANCE AND BENEFITS OF WASTE MANAGEMENT

Question	Mean	Mode	Standard Dev
C1	3.701149	3	0.794091
C2	3.965517	4	0.855193
C3	3.862069	4	0.864983
C4	3.770115	4	0.831098
C5	4.218391	4	0.705877
C6	3.712644	4	0.847816
C7	4.264368	4	0.738631
C8	3.816092	4	0.883028
C9	3.839080	4	0.874358
C10	3.885057	4	0.981519
Overall	3.903448	4	0.856274781

Looking closer at the data it is seen that the statement (C7) which states that the organisation believes it is ethical to manage food waste effectively received the highest mean of 4.3 which show that respondents agree with the statement. In general, the respondents agreed with most of the statement represented by each individual mode except question (C1) which received a mode of 3. Question (C1) states that the organization meets the current legislation and industry regulations regarding waste management, and so most respondents responded with a neutral answer which might be an indication that respondents might not be fully aware of the legislation and regulations regarding waste management.

4.7 SUMMARY

Chapter 4 was mainly about the interpretation of data received from the respondents about waste management. The Biographical data was first analysed, it was represented by section D. Section A was also discussed and so to see how the respondents feel about the waste management. Section B was focused on the levels of waste management and how the retailers viewed and practised such activities under each level. Section C was to clarify if the

respondents understood and appreciated the benefits and importance of waste management in the community.

CHAPTER 5
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Chapter 5 provides a summarised overview of the preceding chapters. This chapter will summarise and conclude the main findings from the literature review. Lastly, the main findings from the empirical investigations will be provided with detailed references made to any differences or similarities found between the literature review and the findings from the empirical investigation. Furthermore, the main conclusion will be drawn followed by recommendations.

In addition, the shortcomings of the research along with the with recommendations for future waste management research will be presented in the chapter, and the study will conclude with a self-reflection section which will indicate what the researchers have learned from conducting this study.

5.2 SUMMARY OF CHAPTERS

Chapter one provided an introduction and background to the study, the problem statement and the primary and secondary objectives. In addition, the methodological objectives and a brief literature review were provided. Furthermore, the definitions of waste and concepts surrounding the waste management hierarchy were provided. The chapter concluded with the structure of the study and a summary.

Chapter two of the study was the literature review using journals, books and various articles compiled by numerous researchers. This chapter summarised the arguments postulated by different authors about the perception regarding the waste management hierarchy on fast food retailers in Nelson Mandela bay. A theoretical exploration of the nature and importance of the waste management hierarchy was conducted. It discussed the different levels of the waste management hierarchy in detail, followed by reasons to reduce food waste. The chapter assessed the legal aspects surrounding waste management and the impacts of waste management. It was concluded by a brief summary.

Chapter three focused on the research design and methodology, as well as the logic used for the selected methodology. The chapter discussed the sampling techniques and elaborated on the chosen technique; it discussed the sample sizes and measuring instrument used

(questionnaire). The chapter highlighted the primary data collection method and how the data will be analysed. It concluded with an overview and explanation of the ethical considerations and a summary.

Chapter four presented the empirical results of the study. This chapter analysed the primary data collected. It discussed the results concerning perceptions regarding the waste management hierarchy of fast food retailers in NMB. The response rates achieved for this study were reported, including the respondents' demographic information from Section D of the questionnaire. Thereafter, the results of section A, Section B and Section C were discussed.

5.3 RESEARCH DESIGN

5.3.1 POPULATION SAMPLING AND DATA COLLECTION.

The research population consists of all fast food retailers in NMB. However, due to the inability of researchers to test all consumers in NMB, a sample was selected.

In order to successfully address the research objectives, they were divided it into two categories namely secondary and primary research. Non-probability sampling was used, adopting a convenience sampling technique and the sample size of the research consisted of 88 fast food retailers.

5.3.2 QUESTIONNAIRE DESIGN

A questionnaire was designed in order to harvest the information. Sections were used to separate the different categories of information collected. Section A focused on general perceptions regarding waste management. Section B identified perceptions regarding the waste management hierarchy. Section C identified the importance and benefits of waste management. These sections used a 5-point ordinal likert scale to measure responses, and Section D focused on the participant's biographical data using the nominal scale.

5.3.3 PILOT STUDY

The researchers conducted a pilot study through the distribution of 5 self-administered questionnaires among potential respondents in order to determine whether the questionnaire is understandable and effective.

5.3.4 DATA ANALYSIS

The primary data collected from the research question was captured into Microsoft Excel and subsequently exported to statitsca for analysis. Descriptive statistics were utilised to analyse

the data collected of the quantitative study. Following analysis, conclusions and recommendations were made.

5.4 MAIN FINDINGS FROM THE LITERATURE

Several topics were discussed in the literature review (Chapter 2) of this study. The main findings from these topics will be summarised. The study defined waste as any undesirable solid, liquid or gaseous substance which is unwanted after primary use. The increase in middle class influenced a cultural shift and dietary transitions, which have caused an increase in food waste in developing countries (Popkin, Adair & Ng, 2012). Food waste makes a large contribution to the carbon footprint (HLPE, 2014) and is viewed as an economic loss in developing countries (WRAP, 2009).

Chapter 2 discussed the relevance of the waste management hierarchy in relation to the extent of its effects on the environment and what society desires. The chapter introduces the different levels of the waste management hierarchy in order of the most preferred to the least preferred method of waste management. Waste prevention is the most preferred method while disposal is the least preferred method. Moreover, the chapter discusses each level in detail. Food waste has been identified as a waste fraction that should receive priority regarding waste prevention (Sakai *et al.*, 2017). A study by Ferrari *et al.* (2016) suggested that developing countries must not prioritise waste management in the short run. Neff, Kanter and Vandevijvere (2015) recognised that the contribution of excess stock to food waste can be reduced by repurposing. For instance, left overs can be donated to charities before expiration.

This chapter recognised that limited recycling facilities require large investments and the lack of adequate infrastructure is hindering recycling methods in South Africa (Department of Environmental Affairs, 2018). The chapter also identified that leading food retailers in the world are steps ahead of the local standard of recycling. Additionally, energy recovery is discussed and defined as the controlled conversion of waste to energy. It recognises that NMB does not run any facilities that convert energy to waste; South Africa can adopt this method to decrease the burden on landfills. However, there is resistance to adopting this method because of the setup costs and the pollutants that are emitted during incineration (Kaplan *et al.*, 2009). The final level on the waste management hierarchy is disposal, and the study identified South Africa's heavy reliance on landfilling (Friedrich & Trois, 2013). Legislation has been formed in an attempt to reduce landfilling.

Thereafter, the chapter discusses three reasons to reduce food waste, namely ethics and food security, environmental impact and minimisation of costs. The ethics of not wasting food has been adopted in many countries due to famine and poverty, and food preservation culture should be observed. The environmental impacts caused by food waste through greenhouse gas emissions increases the chances of suffering from food insecurity. In addition, minimising costs related to food production is not only an efficient method of financial management but may also affect the future generation positively (Lin *et al*, 2009).

The chapter realises the legislative environment that surrounds waste management. The Waste Act could be the driving force behind the implementation of the waste management hierarchy. It was adopted to address waste issues in the country. The following section deals with the main findings of the empirical investigation.

5.5 MAIN FINDINGS FROM EMPIRICAL INVESTIGATIONS

Findings from the empirical investigations will be discussed in brief .

5.5.1 CONCLUSIONS REGARDING GENERAL PERCEPTIONS OF WASTE MANAGEMENT (SECTION A)

A mode of 4 was observed, indicating that respondents agreed with the statements regarding the general perceptions of waste management. This result was influenced by respondents who had a sense of the nature of waste management. Action must be taken to improve the general perceptions of waste management and this can be achieved through education campaigns. Both fast food employees and members of the general public would benefit from such programmes. As over 50% of the managers within this study did not have any tertiary qualifications, the need for waste management education is evident. Accordingly, some businesses are taking proactive action towards waste. This was reflected by their responses concerning waste management education of the public and staff. Overall, the respondents are pleased with the efforts of Nelson Mandela Bay Municipality, particularly trash collection. However, responses indicated that service delivery is inconsistent between regions, highlighting the need for improvement. Increased awareness of waste management has resulted in the introduction of eco-friendly utensils such as paper straws and biodegradable packaging in some restaurants. The respondents' responses implied a level of concern for the environment in relation to the services they are offering. Without taking any credit from the retailers who are taking part in the

education of the community on waste, improvements can be made to increase education and awareness across fast food retailers.

5.5.2 CONCLUSIONS ON PERCEPTIONS REGARDING WASTE MANAGEMENT HIERARCHY OF FAST FOOD RETAILERS (SECTION B)

Responses from Section B were analysed to identify how different retailers are dealing with the waste they produce in relation to the waste management hierarchy. The section was divided into five parts which will be discussed in the following paragraphs.

5.5.2.1. Waste prevention

Waste Prevention was represented by a set of questions from B1-B10 and the overall mean calculated for this section was 4.03 which indicates that the respondents agreed with most of the statements concerning waste prevention. This highlighted that within NMB, retailers are cognisant of the waste they produce due to the indirect link to costs incurred by the business. An observation that retailers are still reluctant to sponsor campaigns to curb waste was made. An improved approach towards waste educational campaigns will see an improved waste situation within the Bay. A beach clean-up is an example of such a campaign.

The research data collected in this section, showed that respondents agree with the statements concerning waste prevention. The majority of respondents indicated that they keep track of waste production. One method of waste prevention which is in common use is buying in bulk.

5.5.2.2. Re-use

Respondents were also asked if they reuse any material. The overall mean of this section represented by question B11-B15 was a 3.5 which is neutral. This indicates that the culture of reusing is not well established amongst the respondents. One question on whether customers are encouraged to bring reusable packaging (e.g. lunchbox at a restaurant) received the lowest mean. This may be attributed to it being an inconvenience to the customer.

This section will need more attention from the retailers and consumers to reach a point where waste can be reduced with the use of a more efficient reusing system.

5.5.2.3 Recycling

Recycling is a part of the waste management hierarchy which was researched on. Data was collected, analysed and interpreted. The overall mean of the recycling in the fast food retail industry was 3.3 which translates to a neutral response. In this recycling section, there was a large dispersion of the data which indicated that some were taking part in this method while other retailers were not. This is mostly due to the size of the company, with larger companies being more prevalent. However, some sole traders are making efforts to recycle their business materials.

Recycling is a costly method to adopt. Consequently, sole proprietorships with limited funds and capital have considerable challenges in acquiring machinery and technology required for recycling.

5.5.2.4. Energy Recovery

Energy recovery represented by questions B21-B25 received the lowest mean of 2.58 out of all the levels on the waste management hierarchy. Most of the respondents were a small business, and most of them do not have highly educated personnel. This might be a factor to consider because processes of energy recovery need one to be skilled and for the firm to have the capital to invest in such machinery. The larger retailers with more capital to allow growth had positive responses to this section.

Although positive responses were received, it does not change the fact that the mean of energy recovery indicates that the market does not take part in this activity.

5.5.2.5. Disposal

Fast food retailers who were approached indicated that their attitude towards disposal is generally favourable. The mean received in this section was falling under neutral but edged towards agreement. This is because of the different conditions each retailer operates in, but overall, the respondents are mindful of where they dispose and how they dispose of their waste. This also could be helped by the NMB municipality with a better and improved waste refuse system.

The responses in this section had a positive outcome, but until the rest of the bay has the same positive view towards waste, more work can be done to educate and inform the community.

Section B about the waste management hierarchy received an encouraging response from the respondents as they communicated on how they view waste and what they do and can do to reduce the harm it brings to our environment.

5.5.3 IMPORTANCE AND BENEFITS OF WASTE MANAGEMENT (SECTION C)

Questions C1-C10 received a mode of 4 which indicated that the retailers saw and acknowledged the importance and the benefits of waste management. This was all assessed from what the retailer can benefit from taking waste management seriously, such as an improved image if the community and surroundings view one as a waste-conscious entity. Also, because the retailers know that for their existence, they need the consumers, businesses should responsibly take care of their waste in order to protect the stakeholders from any health hazards which come from reckless waste management.

5.5.4 BIOGRAPHICAL INFORMATION OF THE RESPONDENTS (SECTION D)

The data which was collected for this section proved that the industry was primarily dominated by females who took 63% of the managerial positions which were interviewed. Most of the respondents fell under the age group of 31-40 years which also shows that most of the managers fall under this age group due to the experience they will have received from working in the industry.

This industry is also well correlated with personnel which have a qualification of a national diploma or lower with only less than 15% having attained a bachelor's degree or better. Most of the respondents who possessed a national diploma or better had managerial jobs even in more prominent corporations, or they owned their own small business. Most respondents indicated that they had been employed for 1-5 years and 6-10 years which is in line with the years of existence of most interviewed retailers which had operated for less than ten years. Nevertheless, a fair amount of the retailers had operated for more than 11 years. In the fast-food retail business, most of the players do not have many employees due to the form of ownership to the various fast food retailers. 83% of the retails have an employment pool of fewer than 50 people which also can be attributed to the ownership structure of the company. Majority of the retailers are sole traders who have 69% of the surveyed market with partnerships holding 18% with the remainder being private companies, and no public sector company was interviewed.

5.6 LINK BETWEEN THEORETICAL INVESTIGATION AND EMPIRICAL RESULTS

The following section will indicate whether there are any differences or similarities between the literature review and the empirical investigation, complied using a questionnaire.

- Section 2.4.1 in chapter 2 and questionnaire item B9 and B10 that deal with restaurants are purchasing in bulk and preventing over purchasing. The empirical results correspond with the literature that food retailers buy bulk items with stable shelf life, and they strive to prevent over-purchasing of a necessary product and materials by assessing needs (Recycle Track Systems, 2019).
- Section 2.4.3 in Chapter 2 and the questionnaire section B16-B20 that dealt with recycling. The results indicated that respondents there is varied perception regarding recycling and the average responses were neutral to the idea of recycling products, but most of the respondents agreed with the statements suggesting that recycling is a preferred method. The empirical results vary marginally with the literature that states that the limiting factors surrounding recycling in developing countries lead to retailers not employing recycling.
- Section 2.4.4 in Chapter 2 as well as statements B22 deal with incineration as a waste management method by creating waste to energy by burning. The information in the empirical results links with the information in the literature that state that there is no operational incinerator and therefore, it is not an option for the NMB residents (NMBM 2016).
- The same section 2.4.4. in Chapter 2 highlighted how waste to energy is not a popular method of waste management in South Africa (Department of Environmental Affairs 2018) and this agreed with the overall score of 2 of section B21-B25 in the empirical results which suggested that the respondents disagreed with the statements regarding waste to energy.
- Section 2.4.5. and Items B26-B30 examined disposal as the level of the waste management hierarchy. Most respondents agreed that their organisation strives to minimise waste sent to landfills. Nevertheless, the literature review suggested that as much as the government strives to encourage organisations to minimise waste sent to landfills only a few comply (Department of Environmental Affairs, 2018; Godfrey and Oelofse, 2017).

5.7 RECOMMENDATIONS AND INDUSTRY IMPLICATIONS

The responses received from the respondents in line with their view towards waste management can be used to find solutions to the problem organisations are facing in order to improve the waste management situation in the NMB.

5.7.1 GENERAL PERCEPTIONS REGARDING WASTE MANAGEMENT

If the NMB is to have an improved waste management situation than it already has the fast

- Encourage the use of various waste management practices.
- Be knowledgeable of all waste management regulations and be able to abide by them.
- Be satisfied by how the local municipality handles waste management.
- Believe that improper waste disposal is harmful for the environment.
- Strive to create a culture of "going green" in our fast food business.
- Carry out regular campaigns to educate customers and the community regarding effective waste management practices.
- Have strategies in place to improve the process of waste disposal.
- Be satisfied that there are adequate waste disposal facilities in NMB.
- Actively educate employees on the harmful effects of waste on the environment.

5.7.1 PERCEPTIONS REGARDING THE WASTE MANAGEMENT HIERARCHY

The following tables provide some general guidelines and recommendations for improved waste management practices for fast food retailers in NMB. Table 5.1 offers guidelines for improved practices with regard to waste prevention.

TABLE 5.1 GUIDELINES AND RECOMMENDATIONS FOR WASTE PREVENTION, RECYCLING AND REUSE

Waste Prevention
Conduct frequent inventory checks in order to compare purchase amounts and quantity of garbage generated
Closely monitor the amount of food waste they generate.
Be committed to sponsor waste reduction campaigns.
Constantly keep expiry dates of products under review.
Have adequate and effective food storage facilities.
Inspect the quality of every order received.
Change menu options in order to minimize the quantity of leftovers.
Invest in high-quality kitchen equipment and appliances used in food preparation.
Bulk order items with a stable shelf life
Strive to prevent the over-purchasing of unnecessary products or materials.

Reuse
Take orders digitally rather than writing them down on paper to help reduce paper waste.
Donate surplus food to charity as a tool to reduce the waste generated.
Encourage customers to bring their own reusable containers or bags to put in food orders.
Be making efforts to make use reusable packaging as much as possible.
Use laminated menus instead of paper that could be used many times.
Recycling
Use recyclable products in production and packaging.
Use waste water for other purposes (e.g. irrigation).
Make use of different waste containers for recycling (e.g. paper, glass etc.).
Foster formal business relationships with recycling companies.
Give customers a carry-out box to take edible leftovers home to be consumed at a later stage.

Table 5.2 provides guidelines and recommendations for improving waste management practices regarding energy recovery and disposal.

TABLE 5.2 GUIDELINES AND RECOMMENDING FOR WASTE MANAGEMENT REGARDING ENERGY RECOVERY AND DISPOSAL

Energy Recovery
Continuously assess whether waste generated could be used to recover energy.
Create thermal waste-to-energy by burning trash (incineration).
Make use biological processes to break down waste into biogas that could be used as electricity or for heating.
Heat food waste under high pressure to create an oil that can be refined into environmentally friendly bio-fuel.
Have strategies in place to use the waste generated as a source of energy.
Disposal
Strive to minimize the amount of waste sent to landfills.
Adopt the use of a professional disposal company to provide us with a sustainable recycling strategy and encouraging basic food conservation techniques.
Use composting that breaks down biodegradable waste in an enclosed vessel, tunnel or pit.
Separate spoiled foods by acting fast to deal with any food that is spoiled or that will go bad quickly.
Dispose of cooking oils and fats by collecting them in a jar, tub, or other container that can be thrown away.

5.8 SHORTCOMINGS OF RESEARCH AND RECOMMENDATIONS FOR FUTURE RESEARCH

Due to the research being conducted only in Nelson Mandela Bay the results of the study should not be concluded as accurate to other areas outside the NMB, because as the demographics change so does the waste management culture. When it came to complete the questionnaires, some respondents did not know what waste management is. In cases like these one needed to

brief respondents about the practices and then they would start picking up on what activities they take part in and what they do not do.

The results which were obtained from this study were taken from a limited amount of retailers due to the use of convenience sampling, and so these results should be handled with precaution as they might not entirely paint the full picture of how retailers view waste management in the NMB.

The recommendations for future research work would be that more areas should be researched on in order to get a better understanding of how the fast food retailers view waste. More research is needed on the different levels of waste management so that solutions which suit the size and structure of the fast food retailer can be provided to solve the problems faced.

5.9 CONCLUSION

This study was carried out to obtain an understanding of the fast food retailer's view and perception of the waste management hierarchy. The hierarchy has five levels, which were all analysed to see how the market felt about each level. The study first describes the problem of waste and what the implications of improper waste management are, for the immediate community and at a larger environmental scale. Empirical research was conducted to investigate how different fast food retailers view waste management and the data collected was interpreted to acquire a clear picture of the perceptions of waste in the NMB.

Waste prevention had a very positive response which indicated how much the retailers were contributing to the prevention of waste in the Bay. The reuse of production materials had a neutral response which indicated that there is room for improvement where reuse is concerned. Recycling is one the most publicised ways of reducing waste, and in the NMB retailers have confirmed that they are trying to contribute to the recycling of materials, from the classification of waste material when disposing to adopting recyclable materials. This includes cooking oil which can be used for creating fuels for other purposes within the shop. Energy recovery had a neutral response which can be credited to the lack of financial capacity to invest in such equipment without overlooking the fact that employees might not be aware of such methods of waste management. Disposal of waste in the Bay is seen to be useful as most of the respondents indicated their efforts to partake in healthy disposal activities while simultaneously limiting the amount of disposed products.

The study looked at how the different demographics of the retailer and the respondents affect the way, and manner one conducts waste management. From the research, it is seen that women make up much of the industry's management positions. Qualifications of the general population from this research saw that the many of the respondents acquired the highest education level of a national diploma or less. This can also be a factor in why some retailers are not educated about waste management.

For a practical implementation of waste management, there should be a combined effort from all stakeholders within the community. This will call for the municipality to be efficient at collecting waste and informative to the community about waste. The community should also be willing to corporate with the efforts of curbing waste. Retailers should also be mindful of how they dispose their waste and the amount of waste they throw away. Educational campaigns should be held to make sure that the population is educated.

There also should be investments in machinery and ways to reduce the amount of waste produced by outlets. Retailers should adopt recycling and recyclable material, and this might help in reducing the carbon print. Also, while walking around collecting the data from respondents, the researcher noticed a lack of trash bins along with the street ways. The ones which are present are either too far apart due to some along the way being destroyed by mostly the community and the weather to a lesser extent. Dwelling on this point, the community should be educated on the benefits of waste management. Also, the retailers can play a significant part in informing the consumers about waste.

A combined effort is required to be able to have effective waste management because the people who suffer the most from waste-related problems are the people of the community. These people might end up sick because of the various forms of waste that result from the retailers on production and the consumers when they leave the store. Also, the use of donations to help the less fortunate like children homes and even feeding the homeless can be adopted in order to curb waste emission.

From the study, it can be derived that there are efforts within the NMB to influence a movement towards waste management. This is seen with the general agreement reflected by the response's respondents were giving regarding questions of waste management. Room for improvements is there as some areas of the NMB complained about the refuse collection by the municipality at the same time some respondents were happy with the municipality service delivery. There is minimum interaction between the community and the retailers about waste management, and

so that should improve, and so more people should be educated on the matter for it is an issue that affects all stakeholders.

5.10 SELF-REFLECTION

Conducting a treatise is very interesting and informative. This study equipped the researchers with a broader understanding of the waste management hierarchy and the concepts surrounding it. This knowledge gained during the literature review later allowed the researchers to engage with the respondents with better understanding of the topic. The researchers acquired the skill of creating a research instrument, collecting and analysing data using the statistical program statistca. It enabled the researchers to draw up a conclusion. The skills learnt from this study are invaluable and will assist the researchers in future research and their careers.

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NELSON MANDELA UNIVERSITY

ANNEXURE A QUESTIONNAIRE

Nelson Mandela University
South Campus
Department of Business Management
Tel: +27 (0)41504 2033
elroy.smith@mandela.ac.za

September 2019

Dear Sir/Madam

PERCEPTIONS REGARDINGTHE WASTE MANAGEMENT HIERARCHY OF FAST FOOD RETAILERS IN NELSON MANDELA BAY

It is hereby confirmed that Mr Magadzo and Mr Manyangadze are registered honours students the Department of Business Management at Nelson Mandela University. These students are conducting a research project, as part of their treatise, investigating perceptions regarding the waste management hierarchy of fast food retailers in Nelson Mandela Bay.

It would be appreciated if you could assist them in completion of a short questionnaire in this regard. Respond to these statements as it applies to yourorganisation and not as how you would like it to be. Please note that the information provided will be treated as strictly confidential will be used for research purposes only. No individual results will be published.

We must trust that you will find this in order and thank you for your time and effort in this questionnaire.

Kind regards

Prof EE Smith
Research coordinator

Mr A. Manyangadze &Mr M. Magadzo
Honours research students

QUESTIONNAIRE

Please indicate with cross (X) in the appropriate block to show the extent to which you agree with the statements.

(1) Strongly Disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly Agree

SECTION A
GENERAL PERCEPTIONS REGARDING WASTE MANAGEMENT

	My organisation...	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1.	Encourages and uses various waste management practices.	1	2	3	4	5
2.	Is knowledgeable of and adheres to all waste management regulations.	1	2	3	4	5
3.	Is satisfied by how the local municipality handles waste management.	1	2	3	4	5
4.	Believes that improper waste disposal is harmful for the environment.	1	2	3	4	5
5.	Strives to create a culture of "going green" in our fast food business.	1	2	3	4	5
6.	Carries out regular campaigns to educate customers and the community regarding effective waste management practices.	1	2	3	4	5
7.	Have strategies in place to improve the process of waste disposal.	1	2	3	4	5
8.	Believes that there are adequate waste disposal facilities in NMB.	1	2	3	4	5
9.	Actively educates employees on the harmful effect of waste on the environment.	1	2	3	4	5
10.	Provides opportunities to address and manage all waste management hierarchy problems	1	2	3	4	5

SECTION B
PERCEPTIONS REGARDING WASTE MANAGEMENT HIERARCHY OF FAST FOOD RETAILERS

	My organisation …	**Strongly Disagree**	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**
1.	Conducts frequent inventory checks in order to compare purchase amounts and quantity of garbage generated.	1	2	3	4	5
2.	Closely monitors the amount of food waste generated.	1	2	3	4	5
3.	Is committed to sponsor waste reduction campaigns.	1	2	3	4	5
4.	Constantly keep expiry dates of products under review.	1	2	3	4	5
5.	Has adequate and effective food storage facilities.	1	2	3	4	5
6.	Inspects the quality of every order received.	1	2	3	4	5
7.	Changes menu options in order to minimize quantity of leftovers.	1	2	3	4	5
8.	Invests in high-quality kitchen equipment and appliances used in food preparation.	1	2	3	4	5
9.	Bulks order items with a stable shelf life.	1	2	3	4	5
10.	Strives to prevent the over-purchasing of unnecessary products or materials.	1	2	3	4	5
11.	Takes orders digitally rather than writing them down on paper to help reduce paper waste.	1	2	3	4	5
12.	Donates surplus food to charity as a tool to reduce the waste generated.	1	2	3	4	5
13	Encouraging customers to bring their own reusable containers or bags to put in food orders.	1	2	3	4	5
14.	There is a commitment on efforts to use reusable packaging as much as possible.	1	2	3	4	5
15.	Uses laminated menus instead of paper that could be used many times.	1	2	3	4	5

	My organisation …	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
16.	Uses recyclable products in production and packaging is recommended.	1	2	3	4	5
17.	Uses waste water for other purposes (e.g. irrigation).	1	2	3	4	5
18.	Uses different waste containers for recycling (e.g. paper, glass etc.).	1	2	3	4	5
19.	Fosters formal business relationships with recycling companies.	1	2	3	4	5
20.	Gives customers a carry-out box to take edible leftovers home to be consumed at later stage.	1	2	3	4	5
21.	Continuously assesses whether waste generated could be used to recover energy.	1	2	3	4	5
22.	Creates thermal **waste-to-energy** by burning trash (incineration).	1	2	3	4	5
23.	Uses biological processes to break down waste into biogas that could be used as electricity or for heating.	1	2	3	4	5
24.	Heats food waste under high pressure to create an oil that can be refined into **environmentally friendly bio-fuel**.	1	2	3	4	5
25.	Has strategies in place to use the waste generated as a source of energy.	1	2	3	4	5
26.	Strives to minimize the amount of waste sent to landfills.	1	2	3	4	5
27.	Uses a professional disposal company to provide us with a sustainable recycling strategy and encouraging basic food conservation techniques.	1	2	3	4	5
28.	Uses composting that breaks down biodegradable waste in an enclosed vessel, tunnel or pit.	1	2	3	4	5
29.	Separates spoiled foods by acting fast to deal with any food that is spoiled or that will go bad quickly.	1	2	3	4	5
30.	Disposes of cooking oils and fats by collecting them in a jar, tub, or other container that can be thrown away.	1	2	3	4	5

SECTION C

IMPORTANCE AND BENETITS OF WASTE MANAGEMENT

	My organisation …	Strongly	Disagree	Neutral	Agree	Strongly
1.	Meets current legislation and industry regulations regarding waste management.	1	2	3	4	5
2.	Manages waste to improve the health and safety of all stakeholders.	1	2	3	4	5
3.	Manages waste effectively as to minimize costs.	1	2	3	4	5
4.	Has policies in place regarding effective waste management.	1	2	3	4	5
5.	Realises the importance of a commitment to environmental sustainability.	1	2	3	4	5
6	Improves its public image through effective waste management practices.	1	2	3	4	5
7.	Believes it is ethical to manage food waste effectively.	1	2	3	4	5
8.	Educates employees regarding the effect of waste on the environment.	1	2	3	4	5
9.	Raises awareness among employees, customers and the community regarding effective food waste management practices.	1	2	3	4	5
10.	Takes note of environmental impacts caused by food waste through greenhouse gas emission that could impact on food security.	1	2	3	4	5

SECTION D
BIOGRAPHICAL INFORMATION

Please indicate with cross (X) in the appropriate block.

1. Age

Years	21-30	31-40	41-50	51-60	60+
Response	1	2	3	4	5

2. Gender

Male	Female	

3. Highest qualification

Grade 11 and lower	1	Bachelor's degree	
Grade 12	2	Post graduate degree/diploma	
National Diploma or Certificate	3	Other (please specify):	

4. Position in organisation

Top management	1
Middle management	2
Lower management	3

5. Length of current employment

1-5 years	1	11-15 years	3	21+ years	5
6-10 years	2	16-20 years	4		

6. Years in existence of business

1-5 years	6-10 years	11-15 years	16 years +
1	2	3	4

7. Employment size of organization

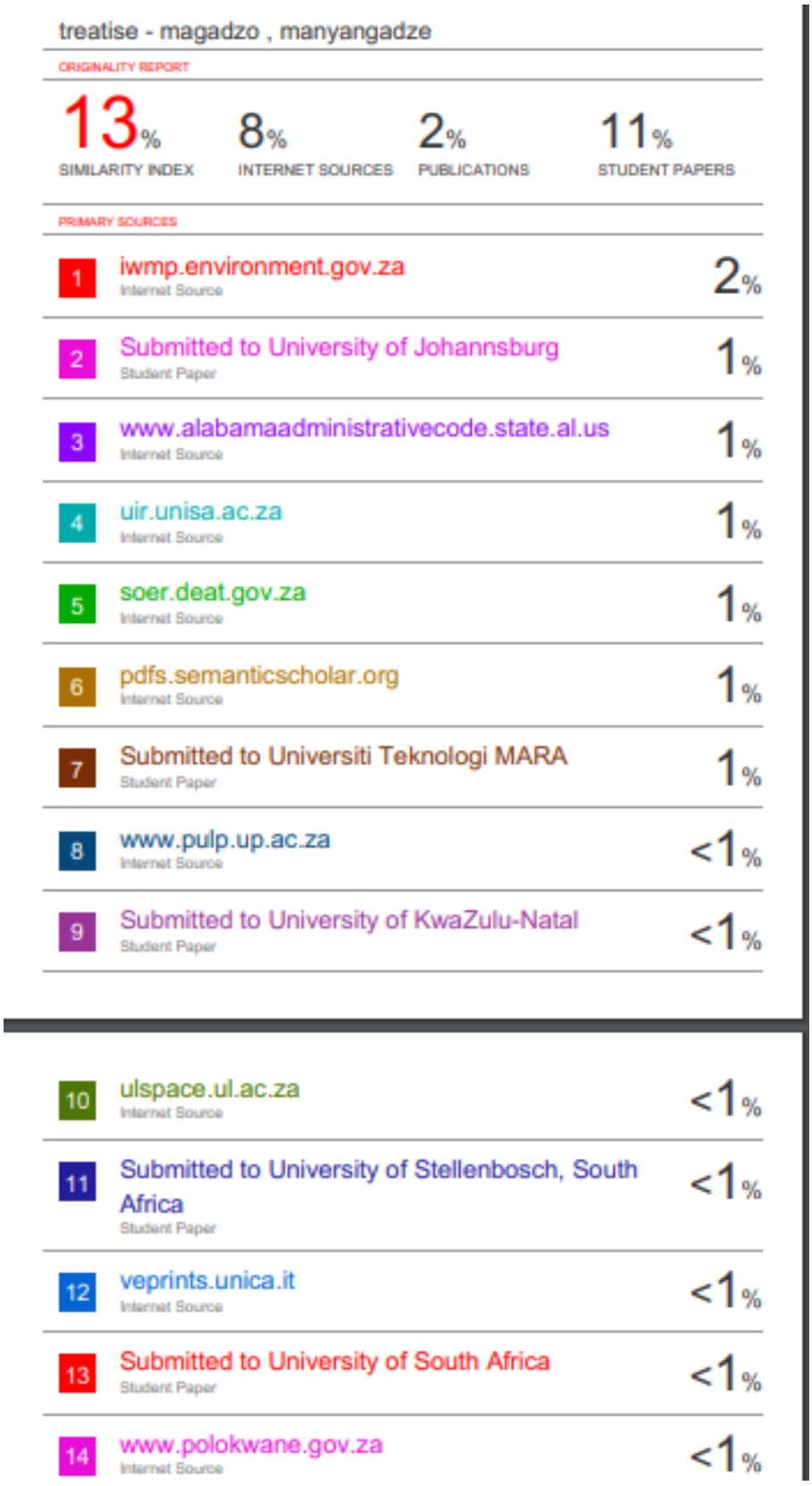
1-50	1
51- 200	2

8. Form of ownership

Sole trader	1
Partnership	2
Private Company	3
Public company	4
Other	5

Thank you for completing this questionnaire

ANNEXURE B TURNITIN REPORT



treatise - magadzo , manyangadze

ORIGINALITY REPORT

13%	8%	2%	11%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	iwmp.environment.gov.za Internet Source	2%
2	Submitted to University of Johannsburg Student Paper	1%
3	www.alabamaadministrativecode.state.al.us Internet Source	1%
4	uir.unisa.ac.za Internet Source	1%
5	soer.deat.gov.za Internet Source	1%
6	pdfs.semanticscholar.org Internet Source	1%
7	Submitted to Universiti Teknologi MARA Student Paper	1%
8	www.pulp.up.ac.za Internet Source	<1%
9	Submitted to University of KwaZulu-Natal Student Paper	<1%
10	ulspace.ul.ac.za Internet Source	<1%
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ANNEXURE C ETHICS FORM E

NELS N M NDELA
UNIVERSITY

FACULTY OF BUSINESS AND ECONOMIC SCIENCES

ETHICS CLEARANCE FOR TREATISES / DISSERTATIONS / THESES

Instructions:

- Should be completed by study leader and student
- Must be signed off by student, study leader and HoD
- *Please note that by following this Proforma ethics route, the study will NOT be allocated an ethics clearance number*

FACULTY: Business and Economic Sciences

SCHOOL / DEPARTMENT: Business Management

I, (surname and initials of study leader) Prof EE Smith

the study leader for (surname and initials of candidate) Mr A Manyengadze (214377075) and Mr MC Magadze (214379175)

a candidate for the degree of Business Management Honours

with a treatise entitled (full title of treatise):

Perceptions regarding the waste management hierarchy of fast food retailers in Nelson Mandela Bay

considered the following ethics criteria *(please tick the appropriate block)*:

		YES	NO
1.	Is there any risk of harm, embarrassment or offence, however slight or temporary, to the participant, third parties or to the communities at large?		X
2.	Is the study based on a research population defined as 'vulnerable' in terms of age, physical characteristics and/or disease status?		X
2.1	Are subjects/participants/respondents of your study:		
2.1.1	Children under the age of 18?		X
2.1.2	MMMU staff?		X
2.1.3	MMMU students?		X
2.1.4	The elderly/persons over the age of 60?		X
2.1.5	A sample from an institution (e.g. hospital/school)?		X
2.1.6	Handicapped (e.g. mentally or physically)?		X

		YES	NO
3	Does the data that will be collected require consent of an institutional authority for this study? (An institutional authority refers to an organisation that is established by government to protect vulnerable people)		X
3.1	Are you intending to access participant data from an existing, stored repository (e.g. school, institutional or university records)?		X
4	Will the participant's privacy, anonymity or confidentiality be compromised?		X
4.1	Are you administering a questionnaire/survey that:		
4.1.1	Collects sensitive/identifiable data from participants?		X
4.1.2	Does not guarantee the anonymity of the participant?		X
4.1.3	Does not guarantee the confidentiality of the participant and the data?		X
4.1.4	Will offer an incentive to respondents to participate, i.e. a lucky draw or any other prize?		X
4.1.5	Will create doubt whether sample control measures are in place?		X
4.1.6	Will be distributed electronically via email (and requesting an email response)? Note: • *If your questionnaire DOES NOT request respondents' identification, is distributed electronically and you request respondents to return it manually (print out and deliver/mail); AND respondent anonymity can be guaranteed, your answer will be NO.* • *If your questionnaire DOES NOT request respondents' identification, is distributed via an email link and works through a web response system (e.g. the university survey system); AND respondent anonymity can be guaranteed, your answer will be NO.*		X
5	Do you wish to publish an article from this study and submit to an accredited Journal?	X	

and hereby certify that the student has given his/her research ethical consideration and full ethics approval is not required.

Study leader (s)

23 April 2019
DATE

HEAD OF DEPARTMENT

23/04/2019
DATE

STUDENT

26/04/2019
DATE

STUDENT

28/04/2019
DATE