

# Perceptions on integrating informal waste tyre dealers into the formal waste sector: Emalahleni Local Municipality

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Dissertation accepted in fulfilment of the requirements for the degree *Master of Environmental Management with Waste Management* at the North-West University

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Graduation May 2024

30733359

## **PREFACE AND ACKNOWLEDGMENTS**

*This research acknowledges that the informal sector plays a vital role in the management of waste, especially in South Africa. It is, however, not without challenges. This research specifically explores the informal waste tyre sector – an area of scant research in South Africa.*

First and foremost, I'd like to thank the Almighty, God for giving the strength and ability to be able to complete this degree.

I would like to express my sincere gratitude to the North-West University for providing me with the opportunity to study towards this degree and equipping me with the background and knowledge to fulfil it. Thank you to my supervisor, Prof Claudine Roos, for your all your assistance, guidance, patience, support, kindness, and love during this time. Words cannot express how grateful I am to have crossed paths with you. You are the best supervisor anyone could ever ask for, I pray that you continue to be a blessing to others. Thank you to my co-supervisor, Prof. Rinie Schenck.

To my dear parents, Mr Willie and Mrs Peggy Mhlanga, none of this would have been possible without your support. Thank you for everything. You have been there from the very beginning and continue to be there at the finish line. I hope I have made you proud. May God bless you and keep you safe always.

To Abel Mojapelo, Dumisani Mulungwa and Mqondisi Mehlomakhulu, thank you for your assistance in gathering data for this study. I really appreciate it. I couldn't have done it without your help. To all my friends and family who have supported me throughout this entire journey, I hope I have made you proud. It hasn't been an easy ride but I'm grateful that it has come to this.

To the role-players in the Waste Tyre Management sector, thank you for taking your time to participate in the study. Emalahleni Local Municipality informal used tyre dealers, thank you for the opportunity to engage with you, none of this would have been possible without your contribution.

Lastly, I would like to thank myself for not giving up when there was a sense of lost hope. I would like to thank myself for putting all the hours and pushing myself. Little do we take the time to appreciate ourselves, but I would like to start today.

This dissertation is dedicated to my siblings Bradley and Naledi Mhlanga. This should always be a reminder and reassurance that whatever you put your mind to it. You can achieve it! The mind rules the body, it is possible. As your older sister, I have led by example.

## ABSTRACT

In South Africa, the prohibition of waste tyre disposal in landfills has positively impacted landfill usage but led to an increase in illegal dumping of tyres. Although the informal waste sector plays an important role towards the diversion of reusable and recyclable waste from landfill, the informal trading of waste tyres may present several challenges. There are divergent opinions regarding the integration of the informal waste tyre sector into the formal waste tyre management sector in South Africa. While some argue that their inclusion may lead to the regulation of this informal sector, others argue that activities which are not provided for in legislation and may be deemed to be illegal, cannot be regulated.

This research focuses on perceptions surrounding the integration of informal waste tyre dealers (also referred to as informal used tyre dealers or second-hand tyre dealers) into the formal waste sector, focusing on Emalahleni Local Municipality in Mpumalanga, South Africa. Utilising qualitative methods such as interviews and observations, the study uncovers the views of informal tyre dealers and key stakeholders in the formal tyre manufacturing and sales sector. Twenty respondents, including ten informal used tyre dealers and ten from the formal waste and/or tyre sector, participated in the research. Observations identified and described the informal used tyre dealers, their locations, and characteristics, highlighting areas like filling stations, main roads, shopping centres, taxi ranks, and informal businesses in townships.

Interview results elucidated the industry's status and both sectors' perceptions on integrating informal tyre dealers into the formal sector. The informal waste tyre sector expresses a willingness to integrate for better business growth opportunities while feeling secure in their current operations. However, the formal waste tyre sector provided ambiguous feedback, citing concerns such as unsafe tyres, competition, customer poaching, environmental issues, and unsafe working conditions for informal dealers. They also expressed a lack of means to assist in integration, except for providing training in areas like environmental awareness and industry management.

Ultimately, the study aims to inform policy recommendations for a sustainable and inclusive waste tyre management system in Emalahleni and South Africa. The findings contribute to academic discourse and offer practical insights for policymakers, fostering a more inclusive and effective waste management strategy tailored to the local context of Emalahleni.

**Key words:** *Perceptions, waste, waste tyres, informal dealers, waste tyre sector, Emalahleni, legislation, integration*

## **ABBREVIATIONS AND ACRONYMS**

AAA	American Automobile Association
ARO	African Reclaimers Organisation
CBD	Central Business District
CO	Carbon monoxide
CSIR	Council for Scientific and Industrial Research
DEA	Department of Environmental Affairs (now DFFE)
DEAT	Department of Environmental Affairs and Tourism (now DFFE)
DFFE	Department of Forestry, Fisheries, and the Environment
DTIC	Department of Trade, Industry and Competition
ECA	Environment Conservation Act
ELM	Emalahleni Local Municipality
EPR	Extended Producer Responsibility
ETRMA	European Tyre & Rubber Manufacturers' Association
GDP	Gross Domestic Product
GHG	Greenhouse gases
GIS	Geographical Information System
GN	Government Notice
GNR	Government Notice Regulation
GPS	Global Positioning System
GW	General Waste
GWPI	Guidelines for Waste Picker Integration
FNAS-REC	Faculty of Natural and Agricultural Sciences Research Ethics Committee
IAC	Industry Advisory Committee

IIWTMP	Integrated Industry Waste Tyre Management Plan
IndWTMP	Industry Waste Tyre Management Plan
IWMP	Integrated Waste Management Plan
MS	Microsoft
NEMA	National Environmental Management Act
NEMWA	National Environmental Management Waste Act
NHTSA	National Highway Traffic Safety Administration
NOx	Nitrogen Oxides
NWMS	National Waste Management Strategy
NWU	North-West University
PM	Particulate Matter
RDF	Refuse Derived Fuel
REDISA	Recycling and Economic Development Initiative of South Africa
SAWIC	South African Waste Information Centre
SAWPA	South African Waste Pickers Association
SMME	Small, Medium, and Micro-sized Enterprises
SOx	Sulphur Oxides
TIASA	Tyre Importers Association of South Africa
UN	United Nations
UNEP	United Nations Environmental Programme
VOCs	Volatile Organic Compounds
WMB	Waste Management Bureau

## KEY DEFINITIONS

### **Environment:**

means the surroundings within which humans exist and that are made up of –

- (i) the land, water and atmosphere of the earth;
- (ii) micro-organisms, plant and animal life;
- (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and
- (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing (*National Environmental Management Act, 107 of 1998*).

### **Microsoft Teams:**

is a program for video and audio conferencing that allows for both individual and group meetings (*Cambridge Dictionary*).

### **Tyre:**

means a continuous covering made of natural rubber or synthetic rubber or a combination of natural and synthetic rubber encircling a wheel, whether new, used, or retreaded, excluding tyres from monocytes, bicycles and tricycles (*Department of Environmental Affairs, 2017*).

### **Tyre dealer:**

means any person or entity that distributes, or otherwise deals commercially, tyres (*Department of Environmental Affairs, 2017*).

### **Used Tyre:**

Means a tyre that has been used on a car in the past but still has enough tread depth and is undamaged or defect-free to be safely put back to use (*Cambridge Dictionary*).

### **Waste tyre:**

means (a) a new; (b) used; (c), retreaded; or (d) unroadworthy; tyre not suitable to be repaired, retreaded, or sold as a part worn tyre and not fit for its original intended use (*Department of Environmental Affairs, 2017*).

**Waste tyre management plan:**

Means (a) the Integrated Industry Waste Tyre Management Plan of the Recycling and Economic Development Initiative of South Africa, published in Government Notice No. 988, Gazette 35927 of 30 November 2012 and approved by the Minister; or (b) an industry waste management plan for the waste stream of waste tyres as contemplated in section 28 or 29 of the Act, which has been approved by the Minister and published in the Gazette (*Department of Environmental Affairs, 2017*).

**Zoom:**

Is a communications platform that allows users to connect with video, audio, phone, and chat (*Cambridge Dictionary*).

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# CHAPTER 1 INTRODUCTION

## 1.1 Background

Waste tyres are one of the world's leading hazardous solid wastes, and the illegal dumping of waste tyres poses a significant environmental and health risk (Cossu & Stegmann, 2019). The durable composition of tyres makes it almost impossible for biodegrading to occur (Wotjowicz & Serio, 1996), while the uncontrolled burning of waste tyres contributes to the release of nitrogen oxides (NO<sub>x</sub>), sulphur oxides (SO<sub>x</sub>) and other harmful emissions (Muzenda & Popa, 2015). The Africa Waste Management Outlook (UNEP, 2018) mentions the problems related to the illegal dumping and uncontrolled disposal of waste tyres in Africa, while the 2011 and 2020 versions of the South African National Waste Management Strategy (NWMS) both mention waste tyres as a waste stream of concern (DEA, 2011; DFFE, 2020). Concerns around the adverse impacts of waste tyres have resulted in most countries across the world, including South Africa, regulating the management and disposal of waste tyres (Juma *et al.*, 2007).

In South Africa, the disposal of waste tyres to landfill is prohibited in terms of the Norms and Standards for Disposal of Waste to Landfill (GNR. 636 of August 2013) (DEA, 2013). Furthermore, the management of waste tyres has been regulated since 2009 in terms of the Environment Conservation Act (73 of 1989) Waste Tyre Regulations (GNR. 149 of February 2009) (DEAT, 2009). In 2017, these regulations were repealed and replaced by the National Environmental Management Waste Act (59 of 2008) Waste Tyre Regulations (GN. 1064 of September 2017) (DEA, 2017). Amongst other site-specific requirements for the management of waste tyres, the Waste Tyre Regulations (2017) require the development of an Industry Waste Tyre Management Plan.

The Department of Fisheries, Forestry, and the Environment (DFFE) published the draft Industry Waste Tyre Management Plan (IndWTMP) developed by the Council for Scientific and Industrial Research (CSIR) for consultation in March 2022. The IndWTMP is intended to develop an efficient and competitive value chain for South African waste tyre processing through a focused effort to increase processing capacity (beneficiation and recycling). The IndWTMP, furthermore, aims to create local markets for waste tyres and to participate in international markets for waste tyre products, as well as to create opportunities for new Small, Medium and Micro Enterprise (SMME) development and job creation along the value chain (DFFE, 2022).

One increasingly important link in the waste tyre value chain is the informal waste (used/second-hand) tyre dealer. While the draft IndWTMP acknowledges "*informal sector collectors and second-hand tyre dealers*" as a role-player in the waste tyre value chain (draft IndWTMP, DFFE,

2022: 24), it makes no further explicit mention of this role-player in the draft IndWTMP. Furthermore, the draft IndWTMP clearly states that the plan must “*ensure that no waste tyres end up in informal and illegal markets*” (draft IndWTMP, DFFE, 2022: 31). It is these informal (second-hand) tyre markets and the dealers operating them that will be the focus of this research.

## **1.2 Problem statement and rationale for the study**

It is estimated that 2,9 million workers are employed in South Africa’s non-agricultural informal sector (StatsSA 2021), a clear indication of how informal employment continues to provide livelihoods for low-income households. The informal sector plays a significant role in waste management. Thousands of people in developing countries rely on the informal sector in the waste management industry for their livelihoods (Wilson *et al.*, 2006). Utilising existing strategies in waste management from the informal sector can yield better results instead of trying to develop and implement new approaches (Wilson *et al.*, 2006). In South Africa, informal waste pickers, also known as reclaimers, have helped vastly with the diversion of solid waste from landfill sites. Waste pickers also play an essential role in moving towards the circular economy (Littlewood *et al.*, 2022). Campaigns such as “Clean-Up-A-Beach” have been successful throughout the country with the help of waste pickers. In South Africa, waste picker integration has been prioritised through the *Guidelines for Waste Picker Integration* (GWPI), which have been published in 2020. There are also specific organisations, such as South African Waste Pickers Association (SAWPA) and African Reclaimers Organisation (ARO), to represent waste pickers in Africa and South Africa. Although there are health and social disadvantages when waste is not managed correctly, the informal sector contributes greatly to the economy, and this cannot be ignored (Wilson *et al.*, 2006).

South Africa’s economy and standard of living has increased over the years, and this has resulted in increased tyre sales and ultimately waste tyres (Nkosi *et al.*, 2021). Increased tyre sales can offer significant opportunities for informal tyre dealers. Informal tyre dealers can collect used tyres from automotive service centres, car dealerships, and other tyre retailers. They can then resell them to other businesses as scrap material or recycle them into other products such as rubber for playgrounds. They can also sell them to tyre recyclers or to companies that will re-use them for retreading purposes. By doing this, they can often ensure the safe disposal of used tyres and provide an additional source of income for their business.

Schenck *et al.* (2023) distinguish between informal second-hand tyre dealers and used tyre dealers. The authors argue that second-hand tyre dealers sell “used tyres”, which are tyres that has been used on a car in the past, but still has enough tread depth and is undamaged or defect-free and still roadworthy, while used tyre dealers sell scrap/unroadworthy tyres, which are mostly

used for playgrounds and other items (not used as car tyres). Informal tyre dealers do not sell any brand new tyres in their stores hence they are referred to as second-hand or used tyres.

It is acknowledged that jobs are created by informal tyre dealers, however, at the same time concerns have been raised regarding the large number of accidents that are attributed to second-hand tyres which have been imported, collected, or sold in South Africa and neighbouring countries. In Zambia, for example, poor quality, second-hand tyres are regarded as one of the leading causes of road accidents (Kamanga, 2016). Venter *et al.* (2019) and Mavuso (2019) further explain that there are currently no control systems governing the condition of second-hand tyres being sold. Concerns also have been raised that some second-hand dealers apparently regroove the tyres themselves. This creates the impression that a tyre's grooves are sufficiently deep, when in fact the tyre is damaged and dangerous. Another concern is that second-hand tyres might be being illegally imported from other countries. If waste tyres are used as car tyres, there is a risk of blowouts due to the worn state of the tyre, which can lead to severe road accidents. The broken-up rubber of the waste tyres can also affect their traction and contributes to the risk of skidding and loss of road grip, creating a hazardous situation for vehicles. Furthermore, waste tyres may not be suitable for the vehicle's wheel size, potentially leading to further stability issues when driving (Van Beukering *et al.*, 2001).

Except for news articles by Arnoldi (2018) and Venter *et al.* (2019), which voiced concerns that the conduct of informal second-hand tyre dealers could have a negative impact on tyre safety, there has, until recently, been no systematic research on informal second-hand tyre dealers in South Africa. Only very recently (after commencement of this research) in September 2023, Schenck *et al.* (2023) published research titled "*Informal Tyre Dealers in South Africa: An Assessment of Their Contributions to a Circular Economy*". Their research focused on informal second-hand tyre dealers in Cape Town, Pretoria, and Durban, and included 35 informal tyre dealers. Apart from the findings of this recent research, there is limited knowledge about the amount of illegal second-hand tyres sold, where the tyres are obtained and distributed, and who it is sold to. There are also diverging perspectives about integrating the informal waste tyre sector into the formal waste sector in South Africa. Schenck *et al.* (2023) argue that informal tyre dealers can contribute to the circular economy, however, concerns are raised about the unregulated sale of used tyres, which may be unsafe and may pose risks to road users. According to Muzenda and Popa (2015), the lack of knowledge on the informal waste tyre sector contributes greatly to the waste tyre management problem in South Africa. Further research to explore and understand the informal waste tyre sector in South Africa is, therefore, necessary. This research specifically aims to understand perceptions about integrating the informal waste tyre sector into the formal waste sector.

For this purpose, Emalahleni Local Municipality was selected as a case study area. Emalahleni Local Municipality was selected as a case study area, based on the following reasons:

- Like any other municipality in South Africa, Emalahleni continues to fight the battle of against waste management,
- The area is surrounded by several mines with many trucks operating, so it enabled the inclusion of truck tyres,
- A significant number of informal used tyre dealers are observed in the area, and
- The area was accessible to the researcher.

### **1.3 Research aim and objectives**

The aim of the research was to explore perceptions on integrating informal waste (used/second-hand) tyre dealers into the formal waste sector, using Emalahleni Local Municipality as a case study. The research focused on perspectives of informal used tyre dealers, as well as other stakeholders/role-players from the formal waste sector.

In line with the research aim, the following objectives were set:

**Research objective 1:** To identify and describe the informal waste tyre sector in the Emalahleni Local Municipality.

**Research objective 2:** To characterise informal waste tyre dealers in the Emalahleni Local Municipality.

**Research objective 3:** To explore perceptions on integrating/including informal waste tyre dealers as part of the formal waste tyre sector in the Emalahleni Local Municipality.

*Informal waste tyre dealers* are also referred to as “informal used tyre dealers”, “informal tyre dealers” or “second-hand tyre dealers” in this research.

### **1.4 Scope of the research**

This research is focused on exploring perceptions on integrating informal waste tyre dealers into the formal waste sector. The research is performed in Emalahleni as a case study area. For the purposes of this research, “informal waste/used tyre dealers” refers to operators who informally sell tyres - normally on the side of the roads, in townships or central areas (taxi ranks/downtown), industrial areas, or on the outskirts of town.

When describing informal waste/used tyre dealers in Emalahleni, the research focused on gathering information on their (business) location, information about their (business) processes (how/where they acquire the tyres, who tyres are sold to, how long they have been operating, how many persons are employed, etc.) and basic socio-demographic information (age, gender, level of income, level of education).

The research reports on perceptions of different role players, based on interviews. Since the research is based on perceptions, it must be noted that perceptions are based on opinions or beliefs of individuals included in the research and their experiences. These perceptions may not be realised or may not be a true reflection of reality.

Role players approached for participation in this research included those identified in the Waste Tyre Industry Waste Management Plan of (2022): Waste Management Bureau (WMB), Industry Advisory Committee (IAC), Department of Forestry, Fisheries and the Environment (DFFE) , Department of Trade, Industry and Competition (DTIC), the Auditor General, National Treasury, controllers at collection points, operators at tyre pre-processing facilities, transporters, micro collectors of waste tyres, operators of depots or waste tyre storage site, waste tyre processors and tyre consumers (DFFE, 2022). Due to the availability and willingness of potential participants to participate in this research, only the following role players from the formal waste tyre sector were represented in this research: Emalahleni Local Municipality (Environmental and Waste Department), Tyre Importers Association of South Africa (TIASA), Tiger Wheel & Tyre, Point-S, Dunlop Zone Garnis, Thomas Tyres Group of Companies, Geodyn Solutions South Africa, Council for Scientific and Industrial Research (CSIR) and Hi-Q.

The research was conducted between April and August 2023.

### **1.5 Limitations based on the research scope**

This research focused on perceptions of different role players on the integration of the informal waste tyre sector in the Emalahleni Local Municipality. The research findings are based on perceptions of twenty respondents. Ten of the respondents were informal waste/used tyre dealers and 10 respondents were role-players in the formal waste and/or tyre sector.

The research focused on informal dealing of waste tyres only and did not include any other waste streams.

The research findings are limited to the Emalahleni Local Municipality. It may, however, be generalised to other similar municipalities in the South African context.

## 1.6 Structure and outline of the dissertation

This dissertation consists of five chapters, a bibliography and annexures.

- **Chapter 1: Introduction:** Chapter 1 provides the background of the research, problem statement, aims and objectives and the research scope.
- **Chapter 2: Literature review:** The second chapter of this dissertation provides the literature review to provided context to the research. Limited published literature is available on informal tyre dealers in South Africa.
- **Chapter 3: Methodology:** Chapter 3 provides an overview of the methodology with the research design and approach, data collection methods, methods of data analysis, methodological limitations and ethical considerations.
- **Chapter 4: Results and discussion:** Chapter 4 of this dissertation provides a discussion of the research findings related to each of the three research objectives. Where possible, research findings are discussed in the context of similar literature.
- **Chapter 5: Conclusions and recommendations:** The final chapter, Chapter 5, provides the conclusions for the research. Practical recommendations, related to the research aim, and recommendations for future research are also provided.

## 1.7 Chapter conclusion

Chapter 1 outlined the background, problem statement, research aim and objectives, and the scope of the research. Chapter 2 aims to contextualise the research by providing background literature on the research topic.

## CHAPTER 2 LITERATURE REVIEW

### 2.1 Introduction

A literature review compiles, organises, and assesses the writings of other researchers on a certain subject. A literature review typically usually included in a research thesis, although it can also be used as a standalone review of texts on a particular topic (O’Gorman & MacIntosh, 2015). The purpose of this review is to provide context to the dissertation. The literature review was conducted by using platforms such as Google Scholar, Research Gate, University websites, websites with legislation, and the NWU Library, using the following key words in different combinations “*perceptions*”, “*waste*”, “*waste tyres*”, “*informal dealers*”, “*waste tyre sector*”, “*eMalahleni*”, “*legislation*”, and “*integrate*”.

No publications explicitly focusing on *informal used tyre dealers* in South Africa could be found at the time of commencement of this research (March 2023). However, Schenk *et al.* (2023) published research in September 2023, which focused on the contribution of informal tyre dealers in Cape Town, Durban and Pretoria – and assessed their contributions to a circular economy in South Africa. The research by Phale (2005) titled “*Environmental impact and waste management of used tyres in the RSA*” and Mahlangu (2009) on “*Waste tyre management problems in South Africa and the possible opportunities that can be created through the recycling thereof*” provided useful insights about waste tyre management and related issues in South Africa. The research has, however, been conducted more than 14 years ago. In 2013, Nkosi *et al.* did an analysis of waste tyre management plans in South Africa. Although the information provided useful, these plans were, however, never formally adopted and approved by the Minister. Muzenda and Popa (2015) also published research on waste tyre management in Gauteng, focusing on government, industry and community perceptions. This paper focuses mostly on alternative technologies to landfill disposal and does not address the informal dealing/trading in waste tyres.

More recent publications by Arthur *et al.* (2020) on behalf of Sustainable Recycling Industries titled “*Waste tyre management: Baseline study for Ghana*”, Mmereki *et al.* (2016a) titled “*Handling scrap tyres in Botswana: Initiatives, practices, and consequences*” and Mmereki *et al.* (2016b) “*Status of waste tires and management practice in Botswana*” and Abuzukhar *et al.* (2022) on “*Exploring Waste Tyres Problems and Sustainable Waste Management in the Tunisian Context*” provided some interesting perspectives on informal waste tyre trading and waste tyre problems, in general, which could also be applicable to the South African context.

This literature review aims to provide an overview of the existing knowledge regarding waste tyre management, with a specific focus on the perceptions and actions of government, industry, and

local communities. The review will also examine the challenges and opportunities in achieving effective waste tyre management in this context.

## **2.2 Waste tyres as a global concern**

Rapid population growth contributes to solid waste generation which has negative impacts in environmental degradation and the energy crisis faced globally. Waste tyres are one of the common problematic solid wastes produced globally (Williams, 2005).

Approximately 1.4 billion tyres are sold globally each year (Martinez *et al.*, 2013). Millions of end-of-life tyres are either illegally dumped or disposed of in landfills, and only a small percentage are recycled, posing unique problems for each nation or region (Waste & Recycling, 2020). The illegal dumping of waste tyres in communities has resulted in waste tyres being collected and discarded at landfill sites or has led to the illegal use of these (many times unfit) tyres. One of the reasons behind the increase in motor vehicle accidents is due to the use of worn-out tyres (Muzenda & Popa, 2015).

The landfilling of tyres is problematic because it cannot biologically degrade due to its durable nature. As a result, waste tyres have been banned from landfill sites in almost every country, including South Africa (Muzenda & Popa, 2015; DEA, 2013). Banning waste tyres from landfills and implementing mandatory recycling could have a positive overall impact on the environment, create new job opportunities, but also bring about economic and social challenges that require careful management and planning (Matthews, 2006)

Efforts to tackle the waste tyre problem are ongoing, with a focus on recycling, responsible disposal, and the development of more sustainable tyre technologies. As the world continues to urbanise and rely on automobiles, the proper management of waste tyre will remain a critical global concern to safeguard the environment and public health.

### **2.2.1 Adverse impacts of waste tyres**

The sections below elaborate on the environmental-, health and safety-, and economic impacts related to the improper management of waste tyres.

#### **2.2.1.1 Environmental impacts**

According to Fuggle and Rabie (1992:495) as cited by Phale (2005:26), waste tyres can be identified as an inert solid waste. Inert refers to waste that cannot disintegrate naturally, whether it is biologically or chemically (Musarat *et al.*, 2023). Inert waste include cement, glass, bricks, wood, metal, and other types of construction material (Musarat *et al.*, 2023).

Waste tyres pose a significant environmental hazard when left unattended. They can become breeding grounds for pests and disease, while also serving as potential fire hazards. Moreover, waste tyres can leach harmful chemicals into the soil and water, polluting the environment and threatening ecosystems (Mahlangu, 2009).

Due to their undegradable nature, disposing of waste tyres into landfill takes up so much space and is unfeasible (Dabic-Miletic *et al.*, 2021).

Tyres are ideal breeding grounds for vector-borne infections such as West Nile Virus. As it rests, the open centre of a tyre absorbs rainwater, forming small, still water pools. These puddles are ideal for mosquitos to lay their eggs. Storing tyres in this manner is equivalent to creating a habitat for these insects (Dabic-Miletic *et al.*, 2021).

According to Nkosi *et al.*, (2019) the correct disposal and recycling of waste tyres are vital to mitigate environmental damage.

#### **2.2.1.2 Health and safety impacts**

The greatest threat linked with discarding tyres outdoors is the possibility of fire. Tyres contain a high fossil fuel content which is highly flammable. Once the tyres start burning it can lead to very destructive fires as it is not easy to put them out/ extinguish. (Dabic-Miletic *et al.*, 2021). Fires associated with waste tyres pose a significant challenge to firefighters. South African Waste tyre regulations have so many requirements for correct stockpiling, fire breaks and control of emergency incidents for this reason.

Improper disposal of waste tyres, including open burning, releases harmful pollutants into the atmosphere such as PM (Particulate Matter), SO<sub>x</sub> (Sulphur oxides), NO<sub>x</sub> (Nitrogen oxides), VOCs (volatile organic compounds), CO (Carbon monoxide) (Jasmina *et al.*, 2022: 787). These pollutants contribute to air pollution, a major factor in climate change.

According to Mentis *et al.* (2022), the burning of tyres releases toxic chemicals such as polyaromatic hydrocarbons, benzothiazoles, isoprene, and heavy metals like zinc and lead into the atmosphere that may interact with other pollutants as well as biological organisms.

The safety impacts of selling unfit tyres pose significant risks to both drivers and road users. Unfit tyres, whether they are worn, damaged, or of poor quality, can have detrimental consequences on road safety. This issue is a cause for concern, as it can result in accidents, injuries, and even fatalities (NHTSA, 2021).

Driving with worn-out tyres that have low tread depth can lead to reduced traction on wet or slippery road surfaces. According to a report by the National Highway Traffic Safety Administration (NHTSA), tyres with inadequate tread depth are more likely to hydroplane and lose grip, increasing the risk of losing control of the vehicle (NHTSA, 2021). This poses a significant safety hazard, particularly in adverse weather conditions.

Furthermore, tyres that are damaged or compromised may be prone to sudden blowouts or flats, which can be dangerous and even deadly. A study by the American Automobile Association (AAA) found that tyre-related issues are a contributing factor in a significant number of road accidents in the United States (AAA, 2020). These issues can result from the sale of unfit tyres, as consumers may unknowingly purchase tyres with pre-existing damage or wear.

To mitigate these safety risks, it is essential for regulatory authorities to enforce strict standards for tyre quality and tread depth. Consumers must also be vigilant and ensure that the tyres they purchase meet safety requirements. Public awareness campaigns and information dissemination about the dangers of unfit tyres can play a critical role in reducing the incidence of accidents and promoting road safety (NHTSA, 2021).

The safety impacts of unfit tyres being sold are a matter of serious concern. Such tyres can lead to reduced traction, increased accident risk, and potential harm to both the driver and other road users. Strict enforcement of safety standards and consumer education are crucial to addressing this issue and making our roads safer for everyone.

### **2.2.1.3 Economic impacts**

According to Mahlangu (2009) and Nkosi *et al.* (2013), effective waste tyre management can create economic opportunities. Recycling and processing waste tyres can lead to job creation, the development of new industries, and the generation of revenue through the sale of recycled materials or finished products.

The African Waste Management Outlook (UNEP, 2018) reports on some of the success Burkina Faso, where many waste tyre repurposing initiatives exist. Activities include the manufacturing of furniture from used tyres, crafts, and the use of waste tyres as part of traffic control (roundabouts). These “subsistence activities” contribute to the livelihoods of people earning very basic wages, and in some cases has grown into unofficial small businesses.

The opportunity to use waste tyres as a refuse-derived fuel (RDF) to replace coal holds great potential for both environmental and economic benefits. Waste tyres, if managed improperly, can be a significant environmental concern due to their long decomposition time and the risk of fires.

However, when processed and utilised as an alternative fuel source, they can serve as a sustainable and cleaner energy option.

One of the key advantages of using waste tyres as RDF is the reduction of coal consumption. According to a report by the European Tyre & Rubber Manufacturers' Association (ETRMA), substituting coal with RDF derived from waste tyres can lead to a decrease in greenhouse gas emissions and contribute to a more sustainable energy mix (ETRMA, 2019). This shift aligns with global efforts to reduce carbon emissions and combat climate change.

Furthermore, waste tyres used as RDF have a higher calorific value compared to some other waste-derived fuels. This means they can provide an efficient and reliable source of energy, especially in industrial processes such as cement kilns and power plants (U.S. Environmental Protection Agency, 2019). This not only reduces coal consumption but also decreases the environmental impact associated with the extraction and burning of fossil fuels.

The process of converting waste tyres into RDF typically involves shredding and sometimes additional processing to remove contaminants. When performed under controlled conditions, this can be an environmentally responsible way to handle a waste stream that would otherwise pose environmental challenges. For instance, waste tyres have been successfully used as a supplement to traditional fuels in cement manufacturing, improving energy efficiency and reducing emissions (LafargeHolcim, 2021).

While the use of waste tyres as RDF offers numerous benefits, it is essential to consider environmental regulations and quality standards to ensure the safe and sustainable utilisation of this resource. Responsible waste management practices and adherence to emission controls are crucial in this context.

The opportunity to use waste tyres as RDF to replace coal presents a viable and environmentally friendly solution to the challenges posed by waste tyre disposal. By harnessing the energy potential of waste tyres, we can reduce coal consumption, lower greenhouse gas emissions, and contribute to a more sustainable energy landscape.

### **2.3 An overview of the African waste tyre crisis**

Waste tyres can be a significant environmental problem in many parts of the world, including Africa. According to the African Waste Outlook (2018) some of the key issues related to the mismanagement of waste tyres in the African context may include:

- **Improper disposal:** One of the primary issues is the improper disposal of waste tyres. Many used tyres end up in landfills or open dumps, which can lead to various environmental problems, including soil and water pollution.
- **Health and environmental concerns:** Waste tyres, when not properly managed, can be a breeding ground for disease-carrying vectors like mosquitoes. They can also release toxic chemicals and heavy metals when they break down, posing health and environmental risks.
- **Fire hazards:** Accumulated waste tyres can be a significant fire hazard. When they catch fire, they can burn for a long time and release harmful pollutants into the air.
- **Resource recovery:** Used tyres can be recycled or repurposed to make various products, including rubberised asphalt, crumb rubber for sports fields, and other rubber products. However, these opportunities for resource recovery are often underutilised.
- **Regulatory and management challenges:** Many African countries face challenges in implementing effective waste tyre management policies and regulations. Lack of awareness, infrastructure, and resources can hinder proper disposal and recycling efforts (UNEP, 2018).

The African Waste Management Outlook (UNEP, 2018) specifically mentions the problems related to waste tyre dumping, which creates artificial habitats for mosquitoes and flies, leading to the breeding of *Aedes aegypti*, which may lead to outbreaks of the Zika virus (UNEP, 2018: 78).

The next sections provide an overview of waste tyre management in some African countries, including South Africa.

### 2.3.1 Waste tyre management in Ghana

Waste tyre management is a growing concern worldwide due to the environmental and health risks posed by discarded tyres. In Ghana, as in many other developing countries, waste tyre disposal and management have become a critical issue (Arthur *et al.*, 2020).

The proliferation of vehicles in Ghana, driven by economic growth, has led to a significant increase in waste tyre generation. According to Arthur *et al.* (2020), the country produces an estimated 2 million waste tyres annually, which poses environmental hazards such as fire risks and the creation of breeding sites for disease vectors. Improper tyre disposal often results in tyre piles, and when ignited, they release toxic chemicals into the environment, endangering public health.

In Ghana, the legal and policy frameworks for waste tyre management are in place, though implementation remains a challenge. The Environmental Protection Act (490 of 1994) provides the legal basis for environmental protection, including waste management. Furthermore, the

National Environmental Sanitation Policy (2002) highlights the need for proper waste tyre disposal. However, these regulations have not been effectively enforced, and compliance by tyre dealers and consumers is limited (Arthur *et al.*, 2020).

Waste tyre recycling and reuse have gained attention as sustainable solutions to address the growing problem. Various studies (including Nyamekye, 2013; Arthur *et al.*, 2020; Quaicoe *et al.*, 2020) have explored the potential for recycling waste tyres into various products, such as rubberised asphalt, construction materials, and tyre-derived fuel. These initiatives may not only reduce the environmental impact but also provide economic opportunities.

The effective management of waste tyres in Ghana faces several challenges, including a lack of awareness among the public, limited resources for enforcement, and inadequate recycling infrastructure. Additionally, the absence of a comprehensive tyre tracking system hinders the monitoring of tyre disposal and recycling activities (Arthur *et al.*, 2020).

Studies on waste tyre management in other countries have revealed successful practices that could serve as models for Ghana. For example, European countries have established Extended Producer Responsibility (EPR) programmes, where tyre manufacturers are responsible for the end-of-life tyre management, including collection and recycling (Arthur *et al.*, 2020). This approach can be considered in the Ghanaian context.

### **2.3.2 Waste tyre management in Botswana**

Botswana, a landlocked country in southern Africa, has witnessed rapid urbanisation and industrial growth in recent years, which has led to an increase in the generation of waste materials, including waste tyres. Proper management of waste tyres is essential to mitigate environmental and health hazards (Mmereki *et al.*, 2016a).

Waste tyres represent a significant portion of solid waste in Botswana, primarily originating from vehicles, agriculture, and construction activities. The composition of waste tyres in Botswana typically consists of rubber, steel wires, and fabric components, making their disposal and management a complex challenge due to their durability and potential environmental hazards (Mmereki *et al.*, 2016a).

Improper disposal of waste tyres can result in severe environmental issues, including tyre fires, which release harmful pollutants and toxins into the atmosphere and can contaminate soil and water sources (Mmereki *et al.*, 2016a). These environmental impacts emphasise the urgent need for proper waste tyre management in Botswana.

The government of Botswana has recognised the importance of waste management and introduced regulations to address the issue. The Environmental Impact Assessment Act and the Waste Management Regulations outline guidelines for waste management, including waste tyres. However, there may be gaps in the implementation and enforcement of these regulations (Mmereki *et al.*, 2016b).

Waste tyre management practices in Botswana have evolved over the years, with an increasing focus on sustainable and environmentally friendly solutions. Some of the prominent management practices include:

- **Collection and transportation:** Various organisations and private enterprises are involved in collecting and transporting waste tyres to designated disposal sites (Mmereki *et al.*, 2016a).
- **Reuse and recycling:** Efforts are being made to promote the reuse and recycling of waste tyres. Some tyres are refurbished and sold as second-hand tyres, while others are shredded and used for various applications, such as road construction and playground surfacing (Mmereki *et al.*, 2016a).
- **Disposal in landfills:** The most common method of waste tyre disposal in Botswana is landfilling. However, concerns exist regarding the environmental impact of this approach, and improvements are needed in terms of landfill design and management (Mmereki *et al.*, 2016a).
- **Awareness and education:** Public awareness campaigns and educational initiatives play a crucial role in promoting responsible waste tyre disposal and recycling (Mmereki *et al.*, 2016a).

Despite the progress in waste tyre management practices, Botswana faces several challenges:

- **Lack of adequate infrastructure:** Limited facilities for recycling and proper disposal hinder effective waste tyre management.
- **Inadequate enforcement:** There may be a lack of stringent enforcement of waste management regulations.
- **Economic considerations:** The cost of proper waste tyre management can be a barrier to sustainable practices (Mmereki *et al.*, 2016b).

The status of waste tyre management in Botswana reflects the broader challenges faced by developing countries in managing waste materials effectively. While some initiatives and regulations are in place, there is a need for comprehensive policies, infrastructure development,

and increased public awareness to address the environmental and health hazards associated with waste tyres (Mmereki *et al.*, 2016b).

### **2.3.3 Waste tyre management in South Africa**

Several waste tyre manufacturers operate in South Africa. According to the draft Industry Waste Management Plan for Tyres (2020), approximately 16 million tyres are sold in South Africa per year. According to the plan, approximately 170 000 tonnes of waste tyres are generated per year, of which 77% is collected and 24% of the collected tyres are processed (Draft IWMP for tyres, DEFF 2020: 1).

Tyre manufacturers, suppliers, and re-treaders are expected to be actively engaged in sustainable practices, such as recycling and responsible disposal. Research suggests that the industry's perceptions and practices vary widely, and it is important to assess the extent of their involvement in waste tyre management (Muzenda & Popa, 2015). Factors influencing their actions include economic incentives for recycling and the development of secondary markets for used tyres (Muzenda & Popa, 2015).

However, concerns have been raised about the illegal and informal disposal of waste tyres by some industry players, which contributes to environmental contamination and community health risks. Analysing the industry's perspectives and practices is critical to understanding the overall waste tyre management landscape (Muzenda & Popa, 2015).

According to Muzenda & Popa (2015), local communities in South Africa are directly affected by waste tyre management practices. Improper disposal of tyres can lead to environmental pollution and health risks, including fire hazards and mosquito breeding grounds. Community perceptions and concerns regarding waste tyre management are essential in shaping public opinion and potential solutions. Studies focusing on community perceptions reveal that residents in areas with a high prevalence of waste tyre dumping are often vocal about the need for better waste tyre management. Community engagement is crucial for holding both government and industry accountable and for encouraging environmentally responsible behaviours among residents (Muzenda & Popa, 2015).

In South Africa, challenges regarding waste tyre management include the need for improved enforcement of regulations, effective recycling infrastructure, and industry accountability. Opportunities lie in the potential economic benefits of recycling and the development of innovative solutions for waste tyre disposal. The effective management of waste tyres in South Africa, is a complex and multi-dimensional challenge. Understanding the perceptions and actions of

government, industry, and local communities is crucial in developing sustainable waste tyre management solutions (Muzenda & Popa, 2015).

### **2.3.3.1 History of waste tyre management in South Africa**

South Africa has a long history of waste tyre mismanagement, with improper disposal practices leading to environmental degradation, health hazards, and the loss of valuable resources. The lack of effective waste tyre management policies and infrastructure exacerbated these issues, necessitating a comprehensive approach to tackle the problem (Nkosi *et al.*, 2013).

The sub-sections below give a brief overview of how waste tyre management and regulation have changed over time. A more comprehensive overview of the legal framework for managing waste tyres in the country is provided in Section 2.4.

#### **2.3.3.1.1 Waste Tyre Regulations**

The first Waste Tyre Regulations (GNR. 524 in GG 31901 of February 2009) in South Africa were promulgated in 2009 in terms of the Environment Conservation Act (73 of 1989) (ECA). These regulations set a framework for dealing with the management of waste tyres specifically.

These regulations provided requirements for registration, preparation of industry waste tyre management plans (with requirements related to its contents), classifying waste tyres, mutilation of waste tyres, stockpiling and storage of waste tyres, with the main aim being fire prevention.

These regulations were repealed in 2017, when the NEMWA Waste Tyre Regulations (GNR. 1064 of September 2017) were introduced (See Section 2.4.4.4 below).

#### **2.3.3.1.2 The REDISA era**

The Recycling and Economic Development Initiative of South Africa, also known as REDISA, developed an Industry Waste Tyre Management Plan (IndWTMP) (also known as the REDISA Plan), which was gazetted in November 2012. REDISA was operational between 2013 and 2017 and was the entity responsible for waste tyre management in the country.

Waste tyre management includes the collecting, transportation, storage, and pre-processing for distribution of used tires as well as the funding and activities intended to reduce the amount of waste tyres in the environment (REDISA, 2023). Alternatives such as reclaiming, grinding, incineration and retreading of waste tyres have been identified to mitigate the waste tyre management crisis in South Africa. Devulcanisation (softening) of tyres using chemical processes is constantly being investigated as an option for recycling tyres in an eco-friendly manner

(Bockstal *et al.*, 2019). Despite alternatives such as reclaiming, grinding, incineration and retreading, none have been able to solve the waste tyre management crisis in South Africa.

REDISA was in operation from 2013 to 2017, however, was placed under provisional liquidation<sup>1</sup> by the Minister of Environmental Affairs in June 2017. The REDISA plan was withdrawn, together with the liquidation.

The Waste Management Bureau had taken responsibility for waste tyre management since 1 October 2017, after the withdrawal of the REDISA plan.

#### 2.3.3.1.3 Waste Management Bureau

The Waste Management Bureau (WMB) was established as an entity inside the then Department of Environmental Affairs (DEA), now DFFE, through the National Environmental Management: Waste Act 59 of 2008 as amended in 2014. Its primary objectives were specified as developing, monitoring, and supporting industry waste management plans (Section 34D).

The Waste Bureau had taken responsibility for waste tyre management since 1 October 2017, and would exit this operation after the finalisation and implementation of Section 29 of the Industry Waste Management Plan in 2021/22. The Bureau would then focus on their broader mandate, expressed in Section 34 of the National Environmental Management: Waste Act (NEMWA) (Parliamentary Monitoring Group, 2021).

Since initiating waste tyre management, the Bureau has faced the ongoing challenge of expanding its processing capabilities. Several contracted processors ceased their operations in 2019 due to issues such as expired licenses, contractual disputes, and financial unviability. The country boasts a total of 28 depots, with Gauteng hosting the highest number at eight, while the Northern Cape has the fewest, with only one depot. In the 2020/21 period, processing efficiency was additionally hampered by difficulties in securing shredded materials and the repercussions of the COVID-19 pandemic. There was a reduced demand for goods, and a portion of the processors remained offline, preventing them from resuming operations even as lockdown restrictions were gradually lifted (Parliamentary Monitoring Group, 2021).

The Minister of DFFE on 29 November 2019 gave notice in terms of Section 29(1) of the NEMWA to the Council for Scientific and Industrial Research (CSIR) to develop an Industry Waste Tyre Management Plan. The first draft plan was published in March 2020 for stakeholder consultation.

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<sup>1</sup> The judgment was, however, overturned in January 2019 by the Supreme court of Appeal.

#### 2.3.3.1.4 Draft Industry Waste Tyre management Plan

In March 2022, the Industry Waste Tyre Management Plan (IndWTMP) (GN 1849 of 9 March 2022) was gazetted for public comment. The IndWTMP outlines the guidelines and requirements, which must be adhered to and complied with by all role-players in the waste management sector of South Africa (DFFE, 2022). The IndWTMP read with the NEMWA and Waste Tyre Regulations, 2017 as amended will form a comprehensive waste management approach and plan (DFFE, 2022).

The IndWTMP however, does not provide for informal tyre dealers in South Africa.

### **2.4 Policy and legislative context for waste tyre management in South Africa**

The South African government has recognised the environmental and health risks associated with waste tyres and has taken several steps to address the issue. Key legislation, policies and regulations, such as the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), provide a regulatory framework for waste tyre management. The Waste Tyre regulations set standards for waste tyre disposal, recycling, and end-of-life tyre management. However, the effectiveness of these policies in practice, and their enforcement, are crucial aspects that need further exploration (Muzenda & Popa, 2015). Furthermore, the perceptions of government agencies about waste tyre management, including their priorities and strategies, play a pivotal role in shaping the outcomes (Muzenda & Popa, 2015).

It is important to note that the regulatory landscape in South Africa may evolve over time, so it is essential for businesses, organisations, and individuals involved in waste tyre management to stay informed about the latest developments and compliance requirements in the country.

The sections below provide an overview of the legal framework applicable to waste tyre management in the country.

#### **2.4.1 National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended) (NEMA)**

Section 2 of the National Environmental Management Act (107 of 1998) sets principles for environmental management, such as the “duty of care”, “pollution prevention”, “precautionary approach” and others. The NEMA provides the framework for other sector-specific environmental acts.

## **2.4.2 Environment Conservation Act, Waste Tyre Regulations**

The first Waste Tyre Regulations (GNR. 524 in GG 31901 of February 2009) in South Africa were promulgated in 2009 in terms of the Environment Conservation Act (73 of 1989) (ECA). These regulations set a framework for dealing with the management of waste tyres specifically.

The purpose of these Regulations is to regulate the management of waste tyres by providing for the regulatory mechanisms (DEAT, 2009). The regulations detailed the General prohibitions, requirements for the re-use, recycling, or recovery of waste tyres, Duties of tyre producers, tyre dealers and waste tyre stockpile owners, the Contents of an Integrated Industry Waste Tyre Management plan, Contents of a waste tyre stockpile abatement plan as well as the Storage of waste tyres. The regulations also outline the Offences and penalties, Transitional arrangements and commencement as set out by the minister (DEAT, 2009).

Examples of the new regulations include the following;

- Waste tyre mounds are not permitted to be positioned within 8 metres of a power line. Waste tyres must not be kept in wetlands, flood plains, ravines, canyons, steeply sloping surfaces, or anywhere else they may constitute a substantial environmental or fire danger (DEAT, 2009).
- According to the Waste Tyre Regulation, any person who undertakes an activity involving the re-use, recycling, or recovery of waste tyres must, before undertaking that activity, ensure that the re-use, recycling, or recovery of waste tyres is less harmful to the environment than disposal of such waste tyres (DEAT, 2009).

## **2.4.3 National Environmental Management: Waste Act (Act No. 59 of 2008)**

The National Environmental Management Waste Act 59 of 2008 is the regulatory law that deals with the management of waste in South Africa. In addition to national laws, various provinces and municipalities may have their own regulations and bylaws related to waste tyre management. These can vary in terms of specific requirements and regulations for waste tyre disposal and recycling.

The NEMWA provides reasonable measures for the *“prevention of pollution and ecological degradation and for securing ecologically sustainable development; to provide for institutional arrangements and planning matters; to provide for national norms and standards for regulating the management of waste by all spheres of government; to provide for specific waste management measures; to provide for the licensing and control of waste management activities; to provide for the remediation of contaminated land; to provide for the national waste information*

*system; to provide for compliance and enforcement; and to provide for matters connected therewith” (NEMWA, 2008).*

The NEMWA provides a legal framework for the management, reduction, recycling, and safe disposal of waste, including waste tyres. NEMWA emphasises the principles of waste minimisation, extended producer responsibility, and the promotion of recycling.

The regulations and norms and standards (to the NEMWA) discussed in the sub-sections below are applicable to the management of waste tyres in South Africa.

#### **2.4.3.1 National waste information regulations (GNR. 625 of 2012)**

The Waste Information Regulations in South Africa, established under the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), serve the primary purpose of collecting, storing, and disseminating data and information related to waste management.

These regulations are vital for promoting environmental accountability, transparency, and responsible waste management practices (SAWIC, 2021). Entities involved in waste management, including waste generators, transporters, and facilities, are required to report data on the types and quantities of waste they handle. This data is submitted to SAWIC, which is responsible for collecting, managing, and disseminating waste-related information (SAWIC, 2021). The transparency promoted by the regulations enables public access to waste-related information, allowing for informed decision-making and accountability (DEA, 2012). Non-compliance with reporting obligations can result in penalties and legal consequences, highlighting the enforcement aspect of these regulations (DEA, 2012).

The Waste Information Regulations, GNR 625 of 2012, introduced in South Africa, are an essential component of the National Environmental Management: Waste Act (NEM:WA) of 2008. These regulations are designed to serve several key purposes, all aimed at improving waste management and environmental protection in the country.

One of the primary intents of these regulations is to establish a comprehensive system for collecting, recording, and reporting data related to waste management activities. The regulations require various role-players, including waste generators, waste managers, and the government, to gather and submit data on the generation, transportation, treatment, and disposal of waste. This data provides essential insights into the state of waste management in South Africa, helping authorities make informed decisions and policies (DEA, 2012). The regulations seek to create transparency and accountability within the waste management sector. By requiring the reporting of waste-related information, stakeholders are encouraged to track and improve their waste

management practices. The collection of data on the types and quantities of waste generated, recycled, or disposed of is vital for assessing progress and identifying areas for improvement (DEA, 2012).

Furthermore, the intent of GNR 625 is to enable informed decision-making and policy formulation by the government and relevant authorities. The collected data supports the development of effective waste management strategies, resource allocation, and regulatory measures. This information is crucial for setting environmental objectives and standards, identifying trends, and ensuring compliance with environmental laws. The regulations also facilitate public participation and access to environmental information (DEA, 2012). By making waste-related data publicly available, GNR 625 promotes transparency and empowers citizens to engage in discussions about waste management practices and environmental protection. It allows individuals and organisations to access information on waste generation, treatment, and disposal in their communities, fostering a sense of responsibility and environmental stewardship (DEA, 2012).

The Waste Information Regulations, GNR 625 of 2012, were introduced in South Africa with the primary intent of establishing a comprehensive waste data collection and reporting system. This system enhances transparency, accountability, and informed decision-making in waste management and environmental protection. By making waste-related information available to the public, the regulations also encourage citizen engagement and environmental awareness (DEA, 2012).

Waste information regulations also serve as a wellspring of valuable data. They facilitate the collection of critical information regarding waste generation, recycling rates, and disposal practices. This data is indispensable for evaluating the efficacy of waste management policies, crafting innovative strategies, and monitoring progress toward achieving environmental and sustainability objectives (OECD, 2019).

Accountability and compliance are paramount elements of these regulations. Waste generators, transporters, and disposal facilities are subjected to stringent reporting requirements, ensuring that they are answerable for their actions and that they comply with applicable laws and regulations. The transparency facilitated by precise waste information plays a pivotal role in enforcing compliance effectively (United Nations, 2021).

According to the National waste information regulations, waste tyres are recorded as general waste labelled (General waste) GW 54. (DEA, 2012).

### **2.4.3.2 Norms and standards for the disposal of waste to landfill (GNR. 636 of 2013)**

Norms and standards for the disposal of waste to landfill (GNR. 636 of 2013) outlines the comprehensive framework governing the responsible disposal of waste in landfills within the country. The intent of GNR 636 is to ensure that waste disposal in landfills is carried out in an environmentally responsible and safe manner, while adhering to the provisions of the Waste Act (DEA, 2013a).

The primary objective of GNR 636 is to minimise the environmental impact of landfilling operations. It sets forth specific criteria and standards that must be met during the design, construction, operation, and post-closure phases of landfills. These criteria are aimed at preventing pollution and safeguarding the environment from adverse effects associated with landfill activities (DEA, 2013a).

In addition to environmental protection, the regulations contained within GNR 636 are designed to promote the safe disposal of waste. This includes defining waste acceptance criteria, specifying requirements for waste classification, handling, and containment, and ensuring that waste is managed in a manner that does not pose risks to human health or the environment (DEA, 2013a).

Furthermore, GNR 636 plays a pivotal role in ensuring compliance with national norms and standards. It provides a legal framework that mandates that all entities involved in waste disposal to landfills must adhere to the regulations outlined in the document. This promotes accountability and regulatory oversight to ensure that waste management activities are conducted in a manner consistent with the law (DEA, 2013a).

An underlying goal of GNR 636 is to support sustainable waste management practices. It encourages waste minimisation, recycling, and resource recovery, thereby contributing to a more sustainable approach to waste management in South Africa. The regulations set the stage for responsible waste disposal, offering a safe and environmentally sound solution for waste that cannot be diverted from landfills, in alignment with broader environmental and sustainability objectives (DEA, 2013a).

Waste tyres are only to be disposed of at a Class C landfill designed in accordance with the requirements for a GLB+ Landfill as specified in the minimum requirements for the Waste Disposal by Landfill. However, there are the following restrictions when these norms and standards come into operation; a whole waste tyre is immediately prohibited from being disposed of in a landfill and quartered tyre is only allowed a period of five (5) years.

### **2.4.3.3 List of activities requiring a waste management licence (GNR. 921 of 2013, as amended)**

Waste management practices play a pivotal role in environmental sustainability. Certain activities within this realm, when mismanaged, can have detrimental effects on ecosystems and human health. One critical issue is the improper disposal of hazardous waste. Inadequate handling and disposal of materials with hazardous properties can lead to contamination of soil and water, posing significant risks to both the environment and human well-being (DEA, 2013b).

Another concerning practice is the open burning of waste. When waste is incinerated in open areas, it releases harmful pollutants into the atmosphere, contributing to air pollution and negatively impacting respiratory health. This underscores the importance of proper waste disposal methods to mitigate these adverse environmental effects (DEA, 2013b).

Landfill management is a key aspect of waste handling, and its inadequacies can lead to environmental degradation. Poorly managed landfills may result in the leaching of harmful chemicals into the soil and groundwater, posing threats to nearby ecosystems and potentially impacting the health of local communities (DEA, 2013b).

Illegal dumping exacerbates environmental concerns by introducing waste into unauthorised areas. This can contaminate natural habitats, water bodies, and soil, disrupting ecosystems and further compounding the challenges associated with waste management (DEA, 2013b).

Finally, the absence or inadequacy of recycling programs contributes to environmental issues. Inefficient recycling initiatives lead to increased landfill waste and the depletion of natural resources. Additionally, the energy-intensive processes involved in manufacturing new materials further contribute to environmental degradation (DEA, 2013b).

According to GNR 921 Category C, norms and standards are applicable to the storage of waste tyres in a storage area exceeding 500 m<sup>2</sup>. Therefore, a waste management license is not required for this activity (DEA, 2013b), however, the storage of tyres exceeding 500 m<sup>2</sup> should be registered with the DFFE and the waste tyre regulations should be implemented.

Any activities involving waste tyres, i.e., recycling, treatment, etc. needs to be licenced if the thresholds exceed that are listed in GNR 921.

#### **2.4.3.4 Waste tyre regulations (GNR. 1064 of September 2017)**

As of 29 September 2017, when the Waste Tyre Regulations were published, any person or entity operating in the waste tyre industry in South Africa is required to register with the Bureau (DEA, 2017). The following regulations have been repealed by these regulations:

- (a) Waste Tyre Regulations, 2009, published under Government Notice No. R149 in Government Gazette No. 31901 of 13 February 2009;
- (b) The amendment to the Waste Tyre Regulations, 2009, published in Government Notice No. 1493, Government Gazette No. 40470 of 2 December 2016.

The waste tyre regulations provide requirements for registration, duties of tyre dealers, preparation of waste tyre stockpile abatement plans (with requirements related to its contents), storage of waste tyres, transitional arrangements, and role of the Waste Bureau.

The reselling of second-hand tyres, for use as a roadworthy tyre, in South Africa is strictly prohibited, used tyres are supposed to be mutilated by the dealers.

#### **2.4.3.5 Regulations regarding the control of the import and export of waste (GN 22 of January 2019)**

The purpose of these regulations is to develop a process to handle the control of the import, export and transit of waste as well as to promote the circular economy by encouraging cradle-to-cradle practices in waste management (DEA, 2019). These regulations require a permit for the transboundary of waste (DEA, 2019). The importation or exportation of waste tyres to or from South Africa, in terms of GN 22 of January 2019 would require a permission from the Minister of Environmental Affairs.

#### **2.4.3.6 Draft industry waste tyre management plan (GN. 1849 of March 2022)**

In March 2022, the Industry Waste Tyre Management Plan (IndWTMP) (GN 1849 of 9 March 2022) was gazetted for public comment. The IndWTMP outlines the guidelines and requirements, which must be adhered to and complied with by all role-players in the waste management sector of South Africa (DFFE, 2022). The IndWTMP read with the NEMWA and Waste Tyre Regulations, 2017 as amended will form a comprehensive waste management approach and plan (DFFE, 2022).

The National Waste Tyre Management Strategy in South Africa, released in 2020, outlines a comprehensive plan to address the challenges posed by waste tyres. This strategy acknowledges

the environmental and health hazards associated with discarded tyres and aims to provide a structured approach to their management.

One of the primary objectives of the National Waste Tyre Management Strategy is to ensure the responsible disposal and recycling of waste tyres. It promotes the establishment of collection points and the proper handling of waste tyres to prevent illegal dumping and the associated environmental pollution (DFFE, 2020). This strategy encourages the development of an integrated waste tyre management system that includes both formal and informal sectors, aiming to reduce the negative impacts of waste tyres. A key focus of the strategy is to promote recycling and the development of a sustainable waste tyre recycling industry. By establishing recycling facilities and encouraging the recycling of waste tyres, the strategy aims to reduce the environmental burden of tyre disposal. It supports the creation of a circular economy approach, where waste tyres are transformed into valuable products, such as crumb rubber for various applications (DFFE, 2020).

To ensure effective implementation, the National Waste Tyre Management Strategy emphasises the importance of regulations and standards. It seeks to create a legal framework that governs the management of waste tyres, outlining requirements for collection, transportation, storage, and disposal (DFFE, 2020). These regulations are designed to ensure that all stakeholders, including producers, collectors, and recyclers, adhere to best practices in waste tyre management. Additionally, the strategy recognises the importance of public awareness and stakeholder engagement. It encourages education and outreach programs to inform the public and industry stakeholders about the importance of responsible waste tyre management. Engaging with the public and relevant sectors is seen as crucial for the success of the strategy. Furthermore, the strategy addresses the issue of waste tyre stockpiles, which can pose significant fire hazards and environmental risks. It aims to reduce the number of existing stockpiles and prevent the formation of new ones through effective monitoring and enforcement of waste tyre management regulations (DFFE, 2020).

The National Waste Tyre Management Strategy in South Africa (2020) provides a structured approach to addressing waste tyres. It emphasises responsible disposal and recycling, the development of a circular economy for waste tyres, the importance of regulations, public awareness, and the reduction of waste tyre stockpiles. By implementing this strategy, South Africa aims to better manage waste tyres and mitigate their environmental and health impacts.

## **2.5 The informal waste tyre sector**

The informal waste tyre sector in South Africa plays a significant role in addressing environmental challenges, job creation, and resource recovery (Mmereki *et al.*, 2010). However, it also faces certain challenges that need attention and regulation.

One of the notable benefits of the informal waste tyre sector is its contribution to environmental sustainability. Waste tyres, if not managed properly, can be a source of pollution and fire hazards. Informal collectors, recyclers, and re-treaders help mitigate these risks by collecting and processing discarded tyres. They prevent the illegal dumping of tyres and contribute to reducing environmental pollution (Mmereki *et al.*, 2010). Moreover, this sector offers job opportunities, particularly for marginalised communities. Many individuals in South Africa, including waste pickers and small entrepreneurs, are engaged in collecting, repairing, retreading, and recycling tyres. These jobs provide a source of income for those who may otherwise face limited employment prospects.

However, challenges such as inadequate regulation and environmental risks persist in the informal waste tyre sector. Without proper guidelines and regulations, there can be unsafe practices, including the illegal burning of tyres for material extraction, which can release harmful pollutants into the environment (Simpson, 2011). These risks must be addressed to ensure the safety and health of those working in the sector and the broader community. Another challenge is the lack of infrastructure and resources for recycling and processing waste tyres. Without proper facilities and equipment, the sector's efficiency is compromised, limiting its capacity to manage and process the increasing volume of discarded tyres (Semenya & Ramoroka, 2018).

The informal waste tyre sector in South Africa offers important benefits in terms of environmental sustainability and job creation (Mmereki *et al.*, 2010). However, it also faces challenges related to regulation, environmental risks (Simpson, 2011), and the need for better infrastructure (Semenya & Ramoroka, 2018). Addressing these challenges can enhance the contributions of this sector to a cleaner environment and improved livelihoods for those involved.

### **2.5.1 Challenges of the informal waste sector**

The informal waste sector in South Africa faces several complex challenges that have far-reaching implications for environmental sustainability, public health, and the livelihoods of those involved. One significant issue is the limited formal recognition of the informal waste sector, which often operates on the fringes of the formal waste management system. This lack of recognition means that waste pickers and recyclers in this sector do not have access to social benefits and legal protection (Pickersgill, 2018).

The health and safety of those engaged in informal waste picking is a critical concern. These individuals often work in hazardous conditions, sorting through waste to collect recyclable materials. As a result, they are exposed to health risks, including diseases, chemical exposure, and physical hazards (Wright *et al.*, 2013). Additionally, a lack of essential infrastructure, such as safe storage, transportation, and sorting facilities, hinders the efficiency and effectiveness of their operations (Mbohwa & Krüger, 2017). One of the more pressing challenges for informal waste pickers is the inconsistent income they earn. Their livelihoods are heavily dependent on factors such as market prices for recyclables and the quantity of waste they can collect. This unpredictability makes it difficult for them to plan for their financial well-being (Zerbo & Emery, 2015). Legal barriers can also pose hurdles to their work, with regulations and bylaws sometimes restricting access to waste disposal sites and formal recycling centres (Cointreau, 2006). Furthermore, there is a lack of training and capacity-building within the informal waste sector. Many waste pickers lack training in health and safety practices, waste management techniques, and entrepreneurship skills, limiting their ability to improve their working conditions and income (Chipulu *et al.*, 2016).

The challenges underscore the need for the better integration of the informal waste sector into the formal waste management system in South Africa. This integration should focus on improving working conditions, ensuring fair compensation, and promoting environmental sustainability. South Africa has made efforts in recent years to recognise and support informal waste pickers, but there is still work to be done to address these challenges effectively.

### **2.5.2 Benefits of the informal waste sector**

The informal waste sector in South Africa provides several noteworthy benefits, both to the individuals engaged in waste collection and recycling and to society as a whole. One of the most significant advantages is poverty alleviation. This sector offers a source of income to many marginalised individuals, including waste pickers and recyclers, who may have limited access to formal employment opportunities. By engaging in this work, they can improve their livelihoods and reduce poverty (Velis & Wilson, 2012).

Another vital benefit of the informal waste sector is resource recovery and recycling. Waste pickers play a pivotal role in salvaging recyclable materials from the waste stream. This not only diverts materials from landfills but also contributes to reduced resource consumption, aligning with the principles of a circular economy and promoting environmental sustainability (von Blottnitz & Niekerk, 2003). The sector also contributes to the reduction of environmental pollution. South Africa grapples with issues such as litter and uncontrolled dumping. Waste pickers' efforts in collecting recyclables help mitigate these problems, reducing litter and pollution in the

environment (Mathee *et al.*, 2006). Additionally, the informal waste sector leads to cost savings in waste management. By diverting recyclables from landfills, municipalities can lower waste disposal costs, indirectly benefiting local governments and taxpayers. These cost savings can be significant for municipalities (Simatele & Clancy, 2011). Social inclusion is another valuable outcome of the informal waste sector. It offers employment opportunities to marginalised groups, such as women, youth, and the unemployed. By doing so, it promotes social inclusion, providing individuals from these groups with opportunities to earn a living and participate in economic activities (Biehl, 2017). Finally, the sector promotes entrepreneurship. Some waste pickers in South Africa have organised into cooperatives and small businesses, creating entrepreneurship opportunities for themselves. This not only enhances their income but also fosters economic growth at the community level (Uhunamure *et al.*, 2021).

The informal waste sector in South Africa delivers a range of benefits, including poverty alleviation, resource recovery and recycling, pollution reduction, cost savings, social inclusion, and the promotion of entrepreneurship. These advantages underscore the sector's substantial role in addressing environmental, social, and economic challenges in the country.

## **2.6 Integration of the informal waste sector**

Perceptions about the integration of the informal sector into the formal sector in South Africa have evolved over time, reflecting both challenges and opportunities in this process. The integration of the informal sector, which encompasses small-scale businesses, street vendors, and other unregistered economic activities, into the formal economy is a multidimensional endeavour.

Initially, there were concerns about the potential negative impact of the informal sector on the formal economy. Some believed that it might lead to unfair competition, tax evasion, and a lack of regulation. However, over the years, perceptions have shifted as a growing recognition of the informal sector's economic significance has emerged. Many acknowledge the role of the informal economy in providing employment opportunities, reducing poverty, and fostering entrepreneurial spirit (Rogerson, 2007).

Lessons learned from such efforts have shed light on the complexities involved. South Africa's efforts in integrating the informal sector into the formal economy highlight the importance of adopting a multifaceted approach. It is crucial to balance the need for regulation with the need to support and formalise informal businesses. Policymakers have realised that overregulation and harsh enforcement can stifle the potential of informal enterprises. Lessons include the importance of offering training, access to credit, and mentorship to informal sector participants to help them transition into the formal economy (Ntuli, 2014).

South Africa's experience has also shown that fostering partnerships between local governments, private sector actors, and informal business associations can be instrumental in facilitating this transition. Lessons emphasise the need for comprehensive data collection and analysis to better understand the dynamics of the informal sector and tailor policies and interventions accordingly (Turok & McGranahan, 2013).

The perceptions about integrating the informal sector into the formal sector in South Africa have evolved from initial concerns to recognising the informal sector's potential. Lessons learned underscore the importance of a balanced approach that provides support, training, and mentorship while fostering collaboration among various stakeholders. These lessons are instrumental in developing more effective and inclusive policies that can harness the economic potential of the informal sector while mitigating associated challenges.

## **2.7 Chapter summary**

This literature review highlighted the challenges and opportunities in waste tyre management across the globe as well as in the provincial level in South Africa.

The next chapter, Chapter 3 will outline the methodology followed when conducting this research.

## CHAPTER 3 METHODOLOGY

### 3.1 Introduction

The aim of this research is to explore perceptions on integrating informal waste/used tyre dealers into the formal waste sector, using Emalaheni Local Municipality as a case study. The research focuses on perspectives of informal tyre dealers, as well as other stakeholders/role-players from the formal waste sector and are exploratory in nature.

Qualitative research methods are used in this study to determine the perceptions of both the informal tyre dealers and the formal sector. The qualitative research approach is typically used for exploring and understanding perceptions groups and individuals and describe to social problems (Creswell & Creswell, 2018).

### 3.2 Research design

As mentioned above, this research followed a mostly qualitative approach through the application of descriptive observations and conducting interviews. The methods of data collection related to each of the research methods are provided in Table 3-1.

**Table 3-1: Research design**

Research objective	Data collection	Justification
<b>Research objective 1:</b> To identify and describe the informal waste tyre sector	Observations with description of location and surrounding land-use, GIS mapping	Observations assist in understanding the surroundings and current land uses, motivation behind the chosen locations for informal tyre dealing.
<b>Research objective 2:</b> To characterise informal waste tyre dealers in the Emalaheni Local Municipality	Interview with tyre dealers using a structured interview questionnaire	Interviews (supported by structured questionnaires) will allow for in-depth information to be collected during open-ended questions to better understand the perceptions and the general operations of the informal waste tyre industry (Mears, 2012; Horton <i>et al.</i> , 2004).
<b>Research objective 3:</b> To explore perceptions on integrating/including informal waste tyre dealers as part of the formal waste tyre sector	Interviews with other stakeholders/role-players	

Interviews will offer a better understanding of the informal dealers instead of using survey questionnaires because they will freely express how they feel. The perceptions of the different role-players in the formal waste tyre sector will have an impact on understanding how the informal

tyre dealers could possibly have integrated in the formal industry. According to Horton *et al.* (2004) and Mears (2012), interviews and semi-structured questionnaires provide for the gathering in-depth responses as well as answers based on real-life experiences. Interviews will be supplemented by observations as a means of providing a description of the characteristics of the informal tyre dealerships in and around the case study area.

### 3.3 Case study description

Due to many local municipalities in South Africa (278), a representative sample approach could not be followed for this research, and therefore a case study approach was preferred. Ultimately, the case study chosen was the Emalahleni Local Municipality, located in Mpumalanga, South Africa.

#### 3.3.1 Case study selection criteria

A purposive sampling approach, where Emalahleni Local Municipality was selected, was founded on the following selection criteria:

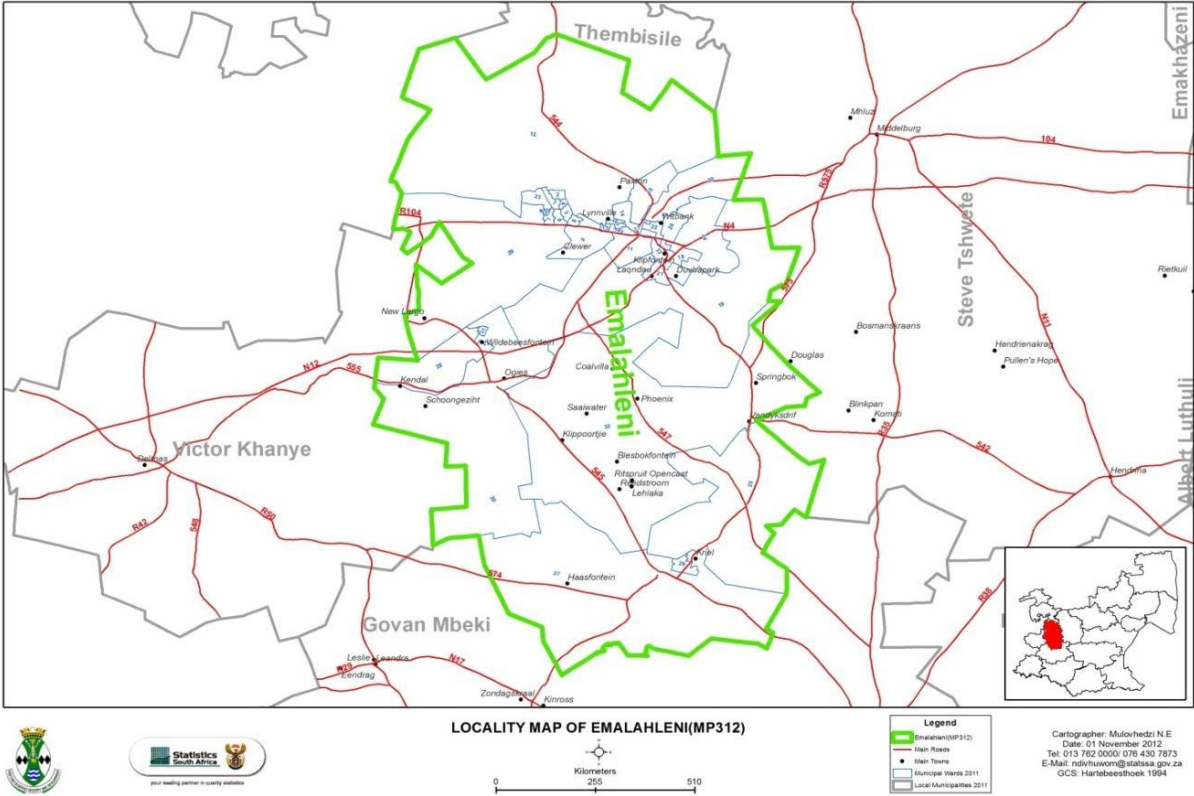
- **Observed evidence of sufficient informal waste tyre traders:** The municipality had to have a significant number of observed informal waste tyre traders to allow for sufficient possible research participants;
- **Observed evidence of sufficient formal waste tyre traders:** The municipality had to have a significant number of observed formal waste tyre traders (i.e., Dunlop, Bridgestone, Tiger Wheel & Tyre) to allow for sufficient possible research participants;
- **Location of the municipality in relation to location of the researcher:** Because of limited time and funds to conduct the research, the municipality had to be within a 50 to 100 km radius from where the researcher was located at the time of this research (i.e., convenience sampling);
- **Opportunity to approach research participants in a safe and secure environment:** The case study area should have sufficient research participants (formal and informal) located in a relatively safe and secure environment (i.e., limitation of unsafe areas or crime hotspots); and
- **Willingness of the municipality to participate in the research:** The municipality had to agree to participate in the research.

#### 3.3.2 Description of the case study area

Emalahleni Local Municipality is located in the Nkangala District Municipality situated in Mpumalanga Province in South Africa. Emalahleni is a Nguni name which means “place of coal”. It is situated in the Highveld region. It borders Gauteng province and is a part of the province's

western areas. Emalahleni Local Municipality comprises of 34 wards with a population of 395,466 in 2011 (StatsSA, 2021). The highest racial makeup consists of the Black African which a total of 81.3% in 2011 (StatsSA, 2021). The main urban centre is called eMalahleni City, and comprises of other towns known as Ogies, Phola, Ga-Nala, Thubelihle, Rietspruit, Van Dyksdrift, and Wildge (StatsSA, 2022) (Figure 3-1).

Emalahleni is the most industrialised city in Nkangala due to the presence of surface and underground coal mines. The majority of South Africa's coal fired power stations are located in this region such as Kendal, Matla, Duvha and Ga-Nala. The region's historic sites reflect its mining and industrial past. This comprises pieces of architectural and engineering history, military history, industrial history, and tombs, all of which need to be preserved and maintained.



**Figure 3-1: Locality Map of Emalahleni Local Municipality (Emalahleni Local Municipality, 2023a)**

Emalahleni is a rapidly growing municipality due to employment in the coal mining industry and electrical supply industry (Eskom). Most of the workers reside in the townships scattered across and in close proximity to the mines and power stations. Informal tyre dealers are often located in the centre/hub of the busiest townships. The increase in population contributes to the need for motor vehicles and thus the demand for tyres rises.

### **3.3.3 Waste management in Emalahleni Local Municipality**

Waste management remains to be a challenge in the Emalahleni Local Municipality. Municipalities in South Africa are required to develop integrated waste management plans (IWMPs) that include strategies for the management of waste tyres within their jurisdictions. These plans are crucial in addressing local waste management issues, including waste tyres.

Due to the positive population growth in Emalahleni Local Municipality, it is estimated that the amount of waste being generated will increase yearly (Emalahleni Local Municipality, 2023b). According to the Emalahleni Local Municipality Draft IWMP, no waste tyres (0%) were collected by the municipality in 2022. According to the estimations made, there are 0% of waste tyres at the Leeuwpoort landfill site, 2.27% waste tyres at the Ga-Nala and Phola landfills. Only 1.3% of the waste management budget goes to the management of waste tyres (Emalahleni Local Municipality, 2023b).

Waste tyre management is highlighted as an area of concern in the Emalahleni Local Municipality IWMP (Emalahleni Local Municipality, 2023b:16).

### **3.4 Data collection**

Data was collected from informal tyre dealers and the role-players in the formal waste tyre sector.

Data from informal tyre dealers were collected between the 11<sup>th</sup> of June 2023 and 29<sup>th</sup> of July 2023 through structured interviews. Informal tyre dealers were identified and located by doing an exploratory drive across the larger municipal area, which include Emalahleni, Ogies, Kendal, Kriel, Van Dyksdrif and Kromdraai. The coordinates of these depots were collected and mapped to create a locality map (Refer to Chapter 4, Figure 4-1).

Interviews (guided by a structured questionnaire) with the role-players in the formal waste tyre sector were conducted between the researcher and participants virtually (via MS Teams or Zoom) from June 2023 to September 2023. Unfortunately, some participants were not available for interviews, and the questionnaire was emailed for completion.

#### **3.4.1 Observations**

Observations included locating and identifying informal tyre dealerships across the Emalahleni Local Municipality. GPS coordinates were captured, and a map was plotted using ArcGIS. provides the location of informal tyre dealerships. Sites were located close to filling stations, taxi ranks, busy/main street as well as the N4 highway. The informal dealerships had no access

control and were easily accessible from all directions. Upon arrival, the size of the stores, its surroundings and adjacent land uses were observed and recorded.

The researcher had no information or pre-defined areas/locations for informal used tyre dealers in the municipal area. Therefore, the observations were exploratory and included the process of driving through Emalahleni and its suburbs for three hours during the morning (08:00 – 11:00) and three hours during the afternoon (15:00 – 18:00) to identify informal used tyre dealers for ten non-consecutive days during a two-week period. All identified used tyre dealers observed during this two-week period were mapped (GIS coordinates) and described. Informal tyre dealers at these locations were approached for interviews (see Section 3.4.2).

### **3.4.2 Interviews**

Interviews are conversations aimed to gather information. The researcher (interviewer) asks the questions, and the participant (interviewee) responds. Interviews can either be conducted face-to-face or telephonically (Easwaramoorthy & Zarinpoush, 2006). Interviews are suitable for research when one desires to attain detailed feelings, opinions, thoughts, and experiences from the respondents (Easwaramoorthy & Zarinpoush, 2006).

#### **3.4.2.1 Developing the interview questionnaire**

The research objectives were used as a guideline for developing the interview questionnaires. Two different questionnaires were prepared for the two different sectors, i.e., the informal tyre dealers and the role-players in the formal waste and/or tyre sector.

**Annexure A** provides the interview questionnaire used for interviews with the formal role-players in waste tyre management sector. The questionnaire consisted of three sections. Section A consisted of background questions of the respondents to determine their demographics, Section B consisted of statements to determine respondents' perceptions about the informal tyre dealers and their potential integration/inclusion. A Likert-scale was used to test the level of agreement of each of the statements. Lastly, Section C consisted of open-ended questions where participants could give detailed answers based on their opinions, challenges, opportunities, and potential integration of informal tyre dealers.

**Annexure B** provides the interview questionnaire used for interviews with informal tyre dealers in Emalahleni Local Municipality. The questionnaire consisted of four sections. Similar to the questionnaire for the formal role-players, Section A consisted of background questions of the respondents to determine the socio-demographics of the informal used tyre dealers. Section B consisted of checkbox/choice questions, these questions were aimed to get more information

regarding the operation of the informal used tyre dealer industry and the respondents could choose more than one option which applies to them. Section C consisted of perception statements, measured by means of a Likert-scale to indicate the level of agreement or disagreement with the statements. Lastly, Section D consisted of open-ended questions where participants could give detailed answers based on their opinions on opportunities, challenges and potential integration.

#### **3.4.2.2 Piloting the interview questionnaire**

The interview questionnaire was piloted by sending it to four students that formed part of the Masters degree in Environmental Management with Specialisation in Waste Management. A couple of re-phrasing suggestions were made, which was incorporated into the final questionnaires.

#### **3.4.2.3 Selection of research participants**

The selection of the participants was mainly based on availability and willingness to participate. The researcher could not accurately determine a sample size of informal tyre dealers in the case study area, since no data bases or any other forms of data/information existed on informal used tyre dealers at the time of doing this research. Furthermore, there were no selection criteria for the informal tyre dealer participants other than being an “informal used tyre dealer” and operating within the case study location (i.e., Emalahleni Local Municipality and its surroundings). Informal used tyre dealers were identified during observations made while driving across the municipality to gather data for the research.

Role-players from the formal sector approached for participation in this research included those identified in the Waste Tyre Industry Waste Management Plan of (2022): Waste Management Bureau (WMB), Industry Advisory Committee (IAC), Department of Forestry, Fisheries and the Environment (DFFE) , Department of Trade, Industry and Competition (DTIC), the Auditor General, National Treasury, controllers at collection points, operators at tyre pre-processing facilities, transporters, micro collectors of waste tyres, operators of depots or waste tyre storage site, waste tyre processors and tyre consumers (DFFE, 2022). The focus was to specifically involve those in Emalahleni Local Municipality as well as Mpumalanga Province.

#### **3.4.2.4 Performing the interviews**

Interviews (guided by a structured questionnaire) were conducted between the researcher and participants both physically and virtually (via MS Teams or Zoom) from June 2023 to September

2023. Unfortunately, some participants in the formal waste tyre sector were not available for meetings.

The researcher conducted face to face interviews with the informal used tyre dealers. The questions were explained in Zulu and Xitsonga as most of the respondents understood it better than English. The researcher was fluent in both languages. The respondents were given a chance to respond in their native languages and the researcher noted down their answers. The researcher conducted interviews with formal role-players via Microsoft Teams, Zoom, as well as face-to-face interviews. Where respondents were not available for interviews, the questionnaire was sent via e-mail for completion.

All respondents had to provide informed consent and could withdraw from interviews at any stage.

### 3.5 Profile of research respondents

A total of twenty respondents participated in the research. Ten respondents were informal used tyre dealers, while the other ten respondents were from the formal tyre/waste tyre sectors. The demographic information of informal used tyre dealers is provided in Table 3-2, while the demographic information of the formal role-players is provided in Table 3-3.

**Table 3-2: Demographics of the informal used tyre dealers**

Demographic information	Number of participants	Percentage
<b>Gender</b>		
Male	10	100%
Female	0	0%
<b>Age</b>		
18-25	2	20%
26-35	6	60%
36-45	2	20%
46-55	0	0%
56-65	0	0%
>65	0	0%
<b>Ethnicity</b>		
African	10	100%
Asian	0	0%
Coloured	0	0%
Indian	0	0%
White	0	0%
Other	0	0%
<b>Level of education</b>		
Tertiary	0	0%

Demographic information	Number of participants	Percentage
High school	4	40%
Primary school	2	20%
Never went to school	4	40%
<b>Employment type</b>		
Full-time	8	80%
Part-time	0	0%
Self-employed	2	20%
Unemployed	0	0%

All of the informal tyre dealer respondents were black African males, with nine out of ten being Mozambican nationals and one individual being South African. The Mozambique border is approximately 300 km from Emalahleni and is relatively easily accessible by car or public transport (taxi/bus). The majority of respondents (6 of 10) were aged between 26 and 35. The highest level of education amongst the informal used tyre dealers is high school (40%), with 20% of respondents having secondary education, and 40% never attending school. The respondents regarded themselves as being full-time employed (80%) or self-employed (20%). These results concur with the research by Schenck *et al.* (2023) on informal tyre dealers from Durban, Cape Town and Pretoria, South Africa, where most of their respondents were black males. They also indicated that about half of their 35 respondents were migrants from neighbouring countries to South Africa.

**Table 3-3: Demographics of the participants from the formal tyre/waste sector.**

Demographic information	Number of participants	Percentage
<b>Gender</b>		
Male	6	60%
Female	4	40%
<b>Age</b>		
18-25	1	10%
26-35	3	30%
36-45	2	20%
46-55	1	10%
56-65	3	30%
>65	0	0%
<b>Ethnicity</b>		
African	3	30%
Asian	0	0%
Coloured	0	0%
Indian	1	10%
White	6	60%
Other	0	0%
<b>Level of education</b>		

Demographic information	Number of participants	Percentage
Tertiary	8	80%
High school	2	20%
Primary school	0	0%
No formal education	0	0%
Employment type		
Full-time	8	80%
Part-time	0	0%
Self-employed	2	20%
Unemployed	0	0%

Six (60%) of the respondents from the formal waste sector were male and 40% were female. Six of the ten participants (60%) were White/ Caucasian, three were African, and one was Indian. In terms of age distribution, the majority of respondents were between 26 and 55 (60%), with one respondent being between 18 and 25, and three respondents between 56 and 65. The majority of respondents (80%) had tertiary education, and two of the respondents completed secondary education. Lastly, eight of the ten respondents were full-time employed, and two of the respondents were self-employed. Two of the respondents were from Emalahleni Local Municipality (Environmental and Waste Department), one of the respondents was from Tyre Importers Association of South Africa (TIASA), one of the respondents was from a Tyre Processing and Waste Treatment Facility (Geodyn Solutions South Africa), five of the respondents were from formal tyre shops located in Emalahleni (Tiger Wheel & Tyre, Point-S, Dunlop Zone Garnis, Thomas Tyres Group of Companies, and Hi-Q) and one of the respondents was from the Council for Scientific and Industrial Research (CSIR).

Due to the relatively small sample size (20 participants), the demographic information of respondents was not used in any associations or correlations with responses provided during interviews. The demographic information is merely given to provide background information on the research participants and demonstrate their representative nature.

### 3.6 Data analysis

Data analysis is the most crucial part of research. It summarises collected data and interprets it using logical reasoning to determine relationships, patterns as well as trends (University of Pretoria, 2023).

For the purposes of this research, answers were recorded during the interview sessions. The data was then put into graphs to understand the correlations between the results. Locations were captured from the GPS camera and a map was designed using ArcGIS to plot the locations of the

informal waste tyre stores to determine if the location and surrounding areas play a role in the sector. The answers recorded were then used to answer the research objections of the research.

### **3.7 Ethical considerations**

Ethical principles were applied in this research. No minors and/or vulnerable persons were interviewed. This research was approved by the Faculty of Natural and Agricultural Sciences Research Ethics Committee (FNAS-REC) of the North-West University Potchefstroom Campus with ethics number: NWU-01227-23-A9. The research proposal followed scientific methods, adhered to the University's required standards as set out in the Academic Rules for Master's and Doctoral students, and the methodology was considered to have minimal risk. Additionally, each participant was required to give informed consent and was made aware of their right to withdraw from the study at any time.

### **3.8 Methodological assumptions and limitations**

The research findings for the informal tyre dealers are only limited to Emalahleni Local Municipality. Other municipalities/areas have not been included in this research. The findings of this research are based on the self-reported responses and perceptions of research participants. Only 20 respondents were interviewed for this research.

### **3.9 Chapter summary**

Chapter 3 presents the methodology which was used for this research. It outlines the geographical area and further gives a summary of the research participants. It details the data collection and analysis, ethical considerations, methodological assumptions, and limitations of the research. Chapter 4 provides the results and discussions of the research.

## CHAPTER 4 RESULTS AND DISCUSSION

### 4.1 Introduction

This chapter presents the results and discussion of the research, which aimed to explore perceptions on integrating informal used tyre dealers into the formal waste sector, using Emalahleni Local Municipality as a case study. The research focuses on perspectives of informal used tyre dealers, as well as other stakeholders/role-players from the formal waste sector.

In line with the research aim, the following objectives were set:

**Research objective 1:** To identify and describe the informal waste tyre sector in the Emalahleni Local Municipality.

**Research objective 2:** To characterise informal waste tyre dealers in the Emalahleni Local Municipality.

**Research objective 3:** To explore perceptions on integrating/including informal waste tyre dealers as part of the formal waste tyre sector in the Emalahleni Local Municipality.

### 4.2 Results related to RO1: To identify and describe the informal waste tyre sector in the Emalahleni Local Municipality

Observations were selected as the preferred method of data gathering to identify and describe the informal waste tyre sector in Emalahleni Local Municipality to better understand the motivation behind the chosen locations.

#### 4.2.1 Observations with description of location

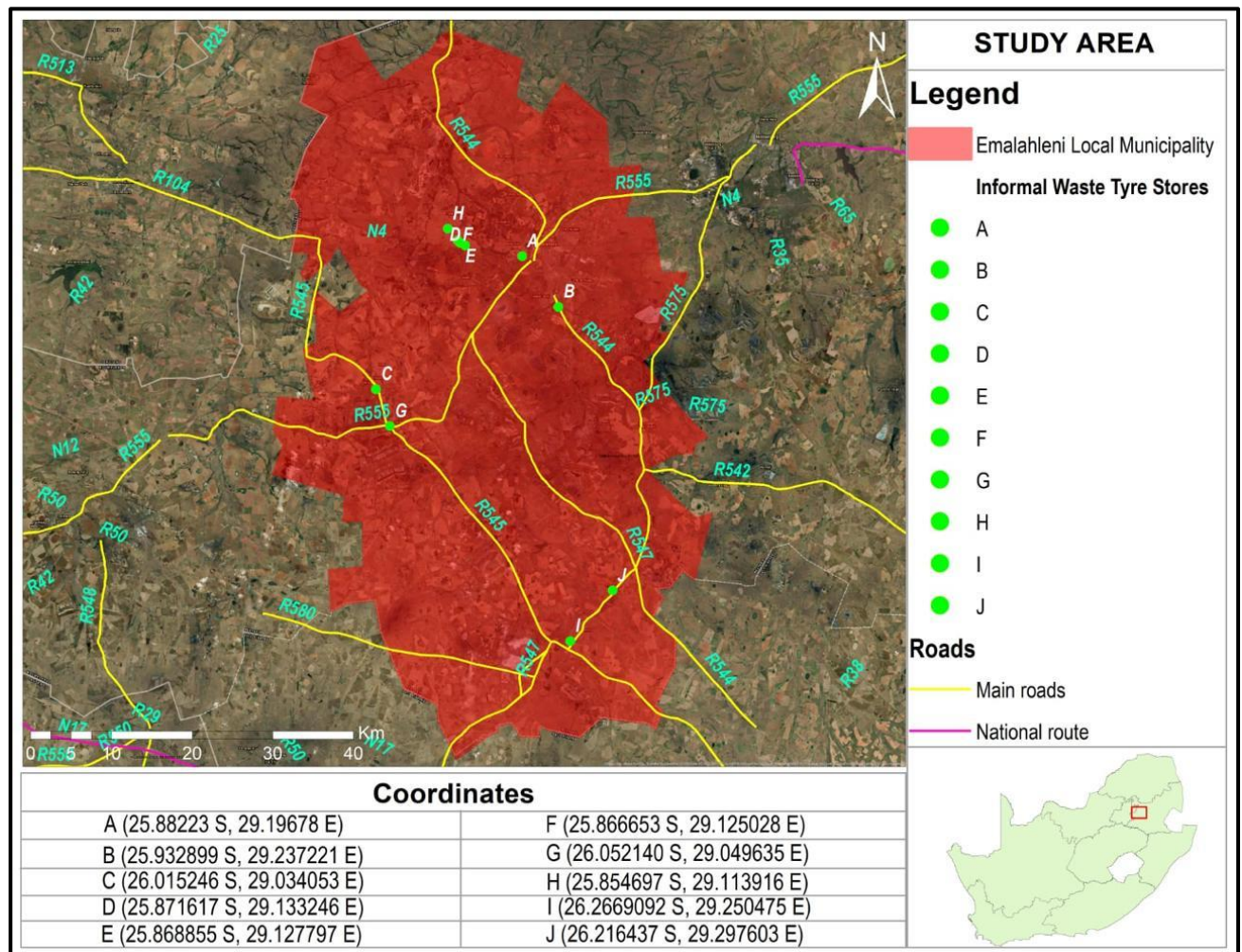
Observations were used to identify and describe the informal used tyre dealers in and around Emalahleni local municipality. As explained in Section 3.4.1, exploratory observations were done to identify the locations and characteristics of informal tyre dealers.

The locations of informal tyre dealers are discussed in Section 4.2.1.1.

##### 4.2.1.1 Locations of informal used tyre dealers

Figure 4-1 provides the location of ten informal used tyre dealers identified in the study area, Emalahleni Local Municipality. These were the only ten informal used tyre dealerships located in Emalahleni and its immediate surroundings at the time of performing this research (April to August 2023). The municipal boundary of Emalahleni Local Municipality is indicated in red. The larger

municipal area includes Emalahleni CBD, as well as surroundings, such as Kriel, Kendal, Phola, Ogies and Springbok (see insert on Figure 4-1).



**Figure 4-1: Location of informal used tyre dealers in and around Emalahleni Local Municipality (ArcGIS, 2023)**

The researcher observed the repeating patterns with the location of the stores, with the majority of the informal tyre dealerships located outside of town, next to main roads, such as the R544, R547 and R555. These informal dealerships were generally easily accessible from different locations. While the informal tyre dealers were located around Emalahleni (in Ogies, Phola, and Kriel), no informal used tyre dealers were observed in Kendal.

The stores were often located in close proximity to formal commercial activities, such as filling stations, shopping centres and truck yards; or in busy areas located in townships (in areas frequently used by vehicles and taxis).

Section 4.2.2 provides a description of the ten informal used tyre dealers located in Emalahleni Local Municipality.

#### 4.2.2 Description of informal used tyre dealers

Table 4-1 below provides a description of the ten informal waste tyre stores/dealerships which were identified in this study. The site description as well as surrounding areas are briefly discussed. Informal used tyre dealers were hesitant to have their photographs taken. Therefore, narrative descriptions are provided.

**Table 4-1: Description of informal used tyre dealerships**

Site	Coordinates	Description
Site A	S25,88223° E29,19678°	Site A is located next to an Engen filling station in Leybank, Tshaka Street, adjacent to the N4 highway in Emalahleni (western Emalahleni). The informal waste tyre store/dealership has no formal structure. Tyres are stacked next to the filling station on the side of the road and are taken away outside of operating hours (during the evenings).
Site B	S25,932899° E29,237221°	Site B is located in Duvha Park along the R544 (southern Emalahleni). The area is largely residential, with some guest houses. There is no formal structure for the trading of tyres. The tyres are stacked under a tree during operating hours and taken away outside of operating hours.
Site C	S26,015246° E29,03405°	Site C was located in the township of Phola. The area is largely residential, with schools, hospitals and a municipal office located in the area. The used tyre dealer operates from an intermodal shipping container. The container is placed next to the fence of the informal used tyre dealer's household fence. During the day the tyres are placed outside the container for advertising.
Site D	S25,871617° E29,13325°	Site D is located in Kwa Guqa (approximately 17km west of Emalahleni CBD) along Mathews Phosa Street. The informal tyre dealership is situated alongside many other general stores. The informal used tyre dealer is operating under a makeshift structure, which is covered with shade netting.
Site E	S25,868855° E29,1278°	Site E is located in close proximity (<1km) from Site D. The site was also located along the Mathews Phosa Street in Kwa Guqa, directly next to an informal furniture shop with couches displayed outside the shop (next to the tyres).

Site	Coordinates	Description
		The informal tyre dealer operates from a more permanent roughly built corrugated iron structure (referred to as a “shack”).
Site F	S25,866653° E29,12503°	Site F is located in close proximity to Sites D and E (<1km), also located along the Mathews Phosa Street in Kwa Guqa, next to a sports field. The informal used tyre dealer operates under a make-shift (temporary) shaded net. Tyres are removed from the area outside of operating hours.
Site G	S25,856719° E29,11512°	Site G is located next to the R555 main road towards Ogies. The informal tyre dealership is located next to a furniture store, Dennis supermarket, a taxi rank, hair salon, optometrist, Afgri (Ogies Silo) and a Sasol filling station. There is no formal building/structure and the store operates from under the trees. Tyres are removed from the area outside of operating hours.
Site H	S25,854697° E29,11392°	Site H is located in close proximity to Sites D, E and F (<1km) along the Mathews Phosa Street in Kwa Guqa. The store is located next to an Engen filling station, now known as Buhlebethu Convenience Centre.
Site I	S26,2669092° E29,2504750°	Site I is situated at the T-junction towards Kriel along the corner of R547 and an unnamed road. The area largely consists of low-cost housing and informal residences. This informal used tyre dealer operates from a small structure located in the owner’s yard. Tyres are displayed outside the gate for advertising purposes. There is also another informal business for fixing and respraying of cars in located in the same yard.
Site J	S26.2164376° E29.2976038°	Site F is located along the corner of the R547 in Kriel. There is a big open space for parking of vehicles (including heavy motor vehicles such as trucks) adjacent to Site F (informal used tyre dealer’s dwelling). The used tyre dealer operates from an informal structure made of corrugated iron that is situated outside his yard.

From the results outlined in Table 4-1, it is clear that informal used tyre dealerships mostly had the following characteristics:

- Used tyre dealerships/stores mostly operated without any formal structures (underneath a tree or shade cloth to provide shade), or where the dealership was located in close proximity to the dwelling/home of the informal used tyre dealer, informal structures were used;
- Used tyre dealerships/stores were mostly located at areas that were:
  - Easily accessible;

- Enjoyed frequent traffic from vehicles, taxis and trucks; and
- Adjacent to open areas, residential areas, or informal commercial areas.
- It was observed that informal waste tyres without any formal structures would move around (differing exact location) within the same area, depending on how busy the area was (seeking for optimal number of potential customers).
- It was noteworthy that in some cases, informal waste tyre trading happened in collaboration with other informal businesses, such as furniture sales, fixing and spray-painting of vehicles, and sale of vehicle parts and hub caps for wheels.

### **4.3 Results related to RO 2: To characterise informal waste tyre dealers in the Emalahleni Local Municipality**

The second research objective aimed to characterise informal used tyre dealers in the Emalahleni Local Municipality. Section B of the questionnaire (Annexure B) prompted informal used tyre dealers to report on:

- Where/how they acquire/get their tyres from;
- Who they sell their (waste) tyres to;
- How much they sell their (waste) tyres for (price per tyre);
- How many years they have been operating as a used tyre dealer;
- How many employees are employed by the business;
- Where (area) they store their tyres; and
- Where they dispose of tyres that cannot be sold.

Section 4.3.1 to Section 4.3.10 outlines the findings related to the above-mentioned questions.

#### **4.3.1 Sources of waste tyres**

All ten of the informal tyre dealers interviewed reported that they received their tyres from formal tyre dealerships (stores), of which the names will not be mentioned here. None of the interviewees opted for the other options provided in the questionnaire (i.e. factories, resellers, import, used tyre suppliers or other). The formal sector reportedly supplies damaged tyres which they cannot resell/repair to the informal used tyre dealers. According to the interviewees, tyre dealers simply call them to come and buy tyres from them. This apparently happens quite frequently (from a daily to a weekly basis). This practice is not provided for in terms of the Waste Tyre Regulations (GN. 1064 of September 2017) (DEA, 2017), which requires that waste tyres must be damaged/mutilated to prevent its unintended/unauthorised re-use and provides for the collection of waste tyres by the Waste Bureau.

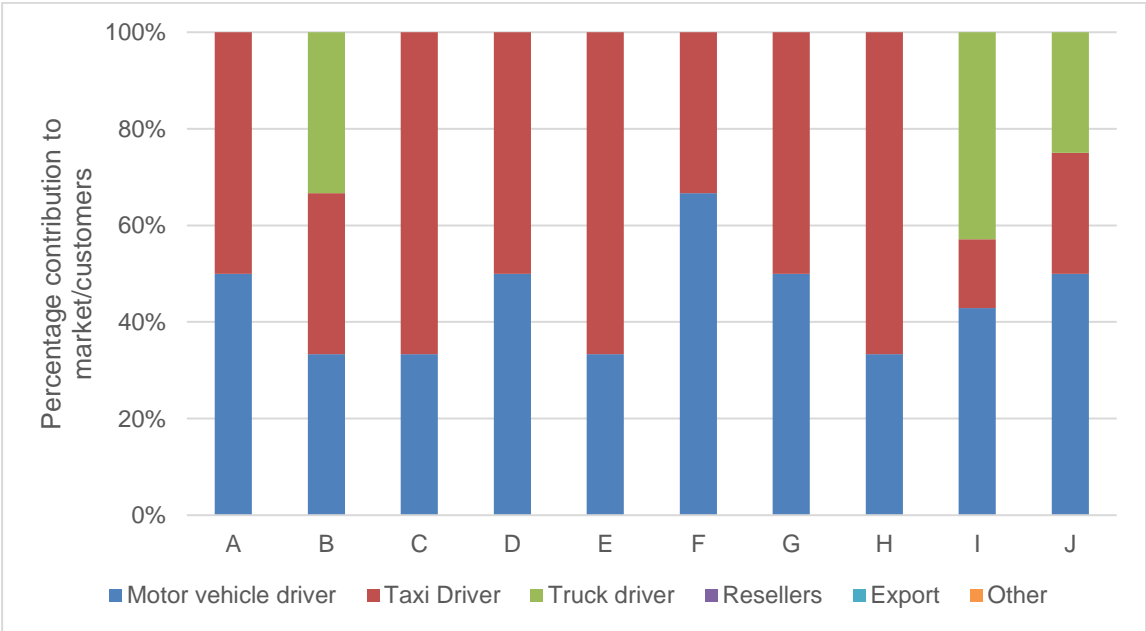
It was not a question posed to formal tyre dealers, however, one of the formal tyre dealerships specifically mentioned that they do not sell tyres to the informal used tyre dealers and reported that they had some incidences where old tyres were stolen from their storage units.

The research by Schenck *et al.* (2023) also indicated that formal tyre dealers were the main source of waste tyres to informal used tyre dealers, with almost 60% of their respondents indicating as such. Other sources of waste tyres mentioned in their research included scrapyards and spare part shops (14%), informal/illegal dumpsites (5%), auctions and repossessed cars (5%), and other/non-identified suppliers (25%).

The informal used tyre dealers were also asked whether they test or inspect the tyres before sale. All ten of the informal used tyre dealers indicated that they do not have any appropriate testing equipment, but that they “test or determine the quality of the tyre by just looking at it”. According to the used tyre dealers, their years of experience in the industry enable them to state the condition of the tyres by merely just observations. Similarly, the research by Schenck *et al.* (2023) indicated that they examine the tyres for any damage before sale.

**4.3.2 Market for the informal used tyre dealers**

Figure 4-2 illustrates the different consumers of the informal used tyre dealers.



**Figure 4-2: Market for the selling of waste tyres from informal used tyre dealers**

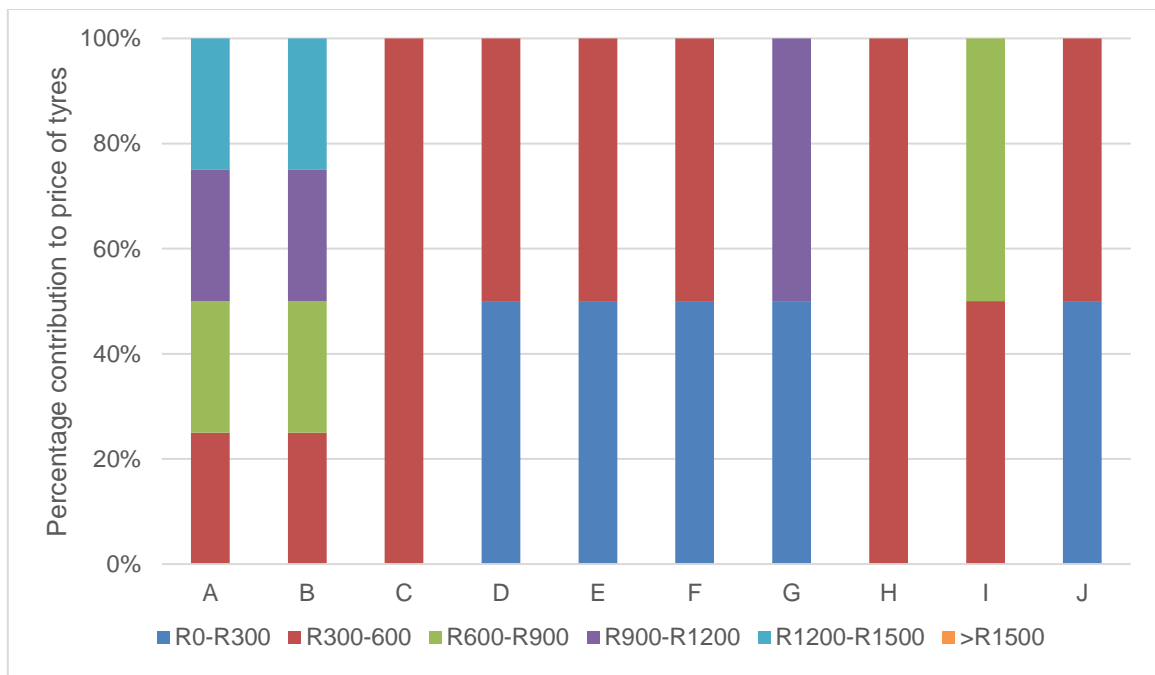
According to the ten used tyre dealers interviewed, the main market (customers) for informal used tyre dealers were motor vehicle drivers and taxi drivers (See Figure 4-2). Car owners and taxi

drivers from nearby communities also comprised the majority of the buyers of second-hand tyres in the research by Schenck *et al.* (2023). However, it was noted at three of the dealerships (Site B, I and J) that truck drivers were amongst their biggest customers. It is interesting to note that all three of these sites were located outside of Emalahleni CBD on the main roads, such as the R544 towards Duvha, and the R547 towards Kriel.

According to Muzenda and Popa (2015), the market/demand of the informal waste sector is complex, often characterised by the collection, recycling, and disposal of waste by individuals or small enterprises outside formal regulatory frameworks. In developing countries, this sector plays a crucial role in waste management, contributing to resource recovery and livelihoods. However, it also poses challenges regarding the use of tyres that are not roadworthy by motor vehicles (as is the case in this research, as indicated in Figure 4-2 above).

### 4.3.3 Prices of the tyres in the informal waste tyre stores

Figure 4-3 illustrates the different prices charged per tyre by the informal used tyre dealers. According to the informal used tyre dealers, different prices are charged per tyre, depending on the size (dimensions) and the condition of the tyre. The “condition” of the tyre is determined by its quality (i.e., signs of damage, depth of tyre tread) and estimated period of use. Size and condition were also mentioned by the respondents included in the research of Schenck *et al.* (2023) as the main factors determining their selling price of waste tyres.



**Figure 4-3: Prices of the tyres in the informal waste tyre stores**

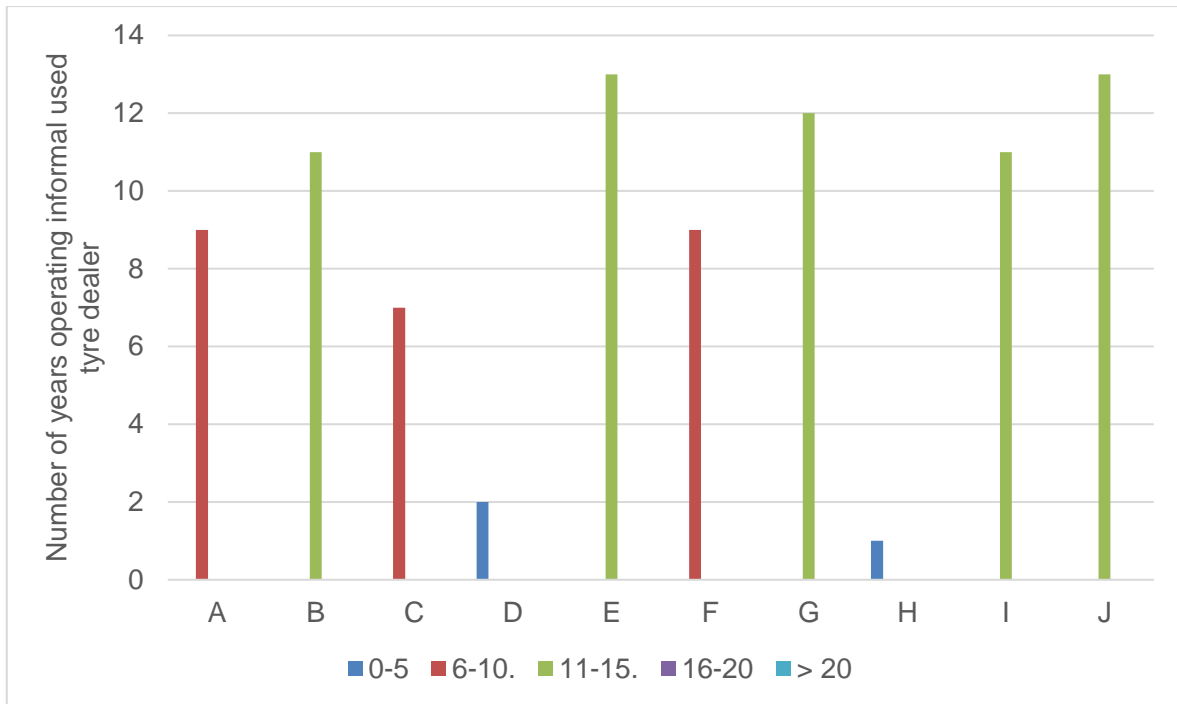
The interview results (Figure 4-3) indicate that the tyres are mostly sold for R300 to R600 per tyre. This corresponds to the research findings of Schenck *et al.* (2023) where tyre prices ranged between R200 and R800. Some used tyre dealers charge less than R300 for tyres that are severely damaged and are considered as unroadworthy. The interviewees indicated that they suspect that these tyres are used to make children's playground apparatus (such as swings) or recycled furniture due to the condition of these (cheaper) tyres. More expensive tyres (R900 – R1200; and R1200 – R1500) are usually larger tyres used for trucks. None of the used tyre dealers reported that they sell tyres for more than R1500 (Figure 4-3).

Understanding prices in the informal waste industry is crucial for addressing sustainability challenges. In the informal waste sector, pricing dynamics can be influenced by various factors. According to a study by Wilson and Velis (2015), informal waste workers often face low and unpredictable prices for the materials they collect, impacting their livelihoods. In many developing countries, the informal waste sector plays a significant role in waste management, yet workers in this sector often lack job security and fair compensation (Medina, 2000). The pricing structures can be affected by market demand, fluctuating commodity prices, and the lack of formalised systems (Wilson & Velis, 2015). Efforts to improve conditions in the informal waste industry may include interventions such as integrating informal workers into formal waste management systems, implementing fair pricing mechanisms, and providing social protections (GIZ, 2019). Understanding and addressing pricing challenges in the informal waste industry are essential for fostering sustainable waste management practices and improving the well-being of those involved.

A used or second-hand tyre are much less expensive when compared to new tyres purchased from a formal waste tyre store. An average tyre for motor vehicles/SUVs is priced from around R900 – R1100 per tyre for unknown brands, while popular brands such as Bridgestone and Michelin cost around R2 200 per tyre. There is also an extra charge for tyre balancing and wheel alignment. Wheel balancing can cost anything from R40 to R50 per wheel, while wheel alignment can cost from R200 to R500, depending on the type of wheel (Supa Quick, 2023).

#### **4.3.4 Period of business operation in the industry**

Figure 4-4 illustrates the number of years the used tyre dealer has been operating, with five of the ten used tyre dealers operating for more than ten years. Three of the used tyre dealers have been operating between seven and ten years, and only two of the used tyre dealers have been operating for two years or less. The average time that the ten used tyre dealers in Emalahleni were operating was 8.8 years.



**Figure 4-4: Number of years the informal tyre business has been operating.**

The research by Schenck *et al.* (2023) on informal used tyre dealers in Durban, Cape Town, and Pretoria, indicated that the average time that used tyre dealers were operating was 7.3 years.

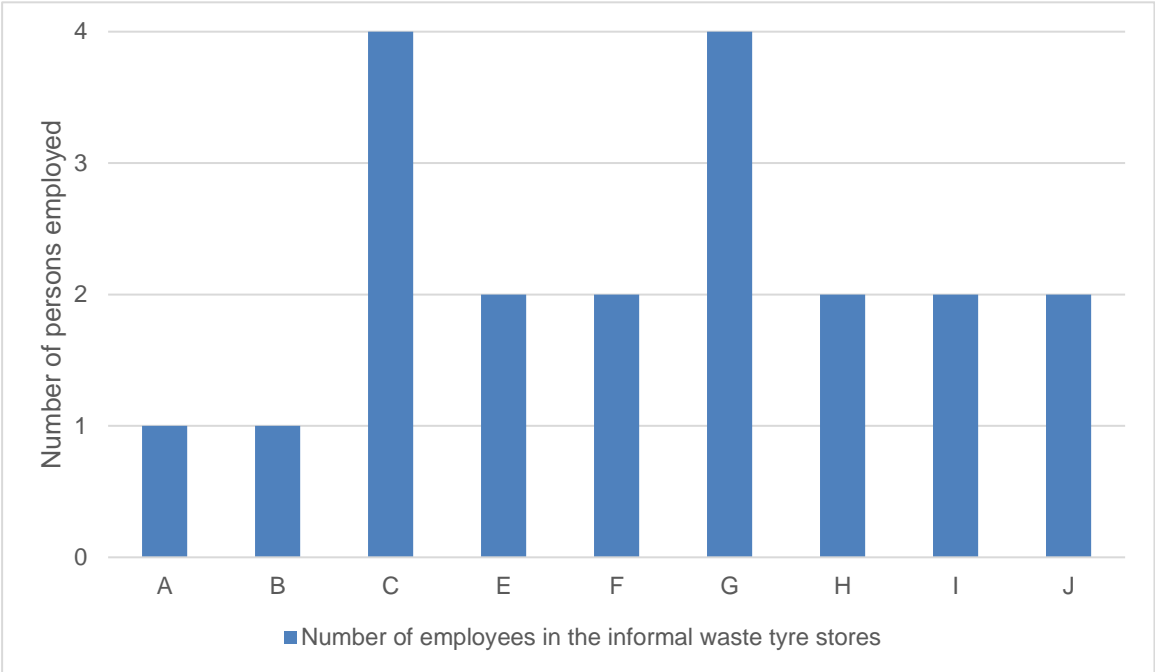
Apart from the research by Schenck *et al.* (2023), comparative literature on the duration of operation of informal used tyre dealers in South Africa (and globally) is limited. Literature on the informal scrapping and recovery of passenger cars in India suggests that employees work for an average of 5 to 10 years in the scrapping business (Sharma & Pandey, 2020). The authors, however, recognise the insufficient research on the informal sector (Sharma & Pandey, 2020).

#### 4.3.5 Number of employees in the business

According to Dias (2016), the informal waste sector generate employment for themselves and others. Research by Coletto and Bisschop (2017) indicate that waste pickers have organised themselves into different business models, with some employing between five to ten informal workers in the Global South.

Figure 4-5 illustrates the number of employees employed by the ten informal used tyre dealerships included in the research. While two of the dealers (Site A and B) only employed themselves, five of the ten dealerships employed one other person (total of two persons employed). Two of the informal used tyre dealerships (Site C and G) employed three other persons (total of four employed) (Figure 4-5). The average number of people employed per

informal tyre dealership was 2.0. This compared well with the average employment of 2.1 persons per informal tyre dealership found by Schenk *et al.* (2023).

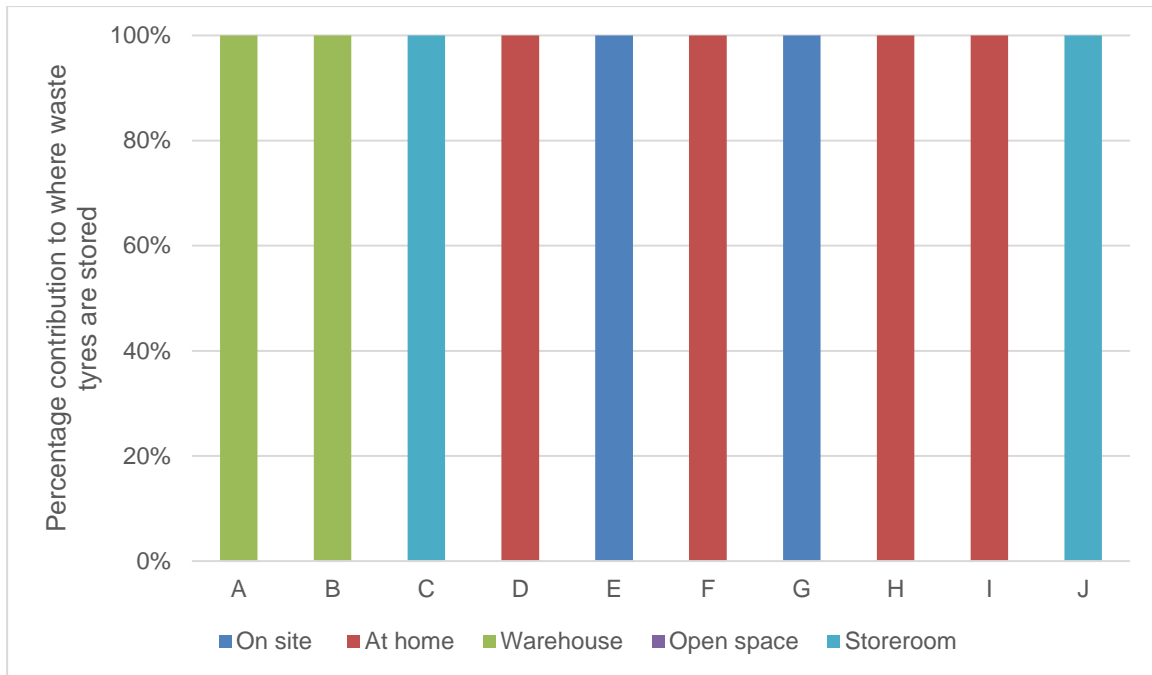


**Figure 4-5: Number of people employed per used tyre dealership**

According to Ton (2014), a company or business that has less than 100 employees is considered a small company, while a company that employs five or less people is known as a microenterprise (Cambridge Dictionary). This is the best way to keep costs low and keep prices down. The informal waste industry creates job opportunities to the unskilled people in the townships and equips them with a skill (Yu *et al.*, 2020). Job opportunities result in the decrease of crime rates in many townships in developing countries such as South Africa. This thus leads to the reduction of poverty and people are enabled to provide for themselves and their families. Formalising or incorporating some aspects of informal used tyre dealing may present opportunities to enhance employment in the sector.

**4.3.6 Storage of the waste tyres**

Schenk *et al.* (2023) highlight “*challenges of not having access to appropriate equipment and sufficient storage space*” to expand used tyre dealers’ operations as a barrier to growth mentioned by many of the informal used tyre dealers included in their research. Similarly, respondents in the present research mentioned that waste tyres had to be removed from the point of sale and stored during non-operational hours (see Table 4-1). Figure 4-6 illustrates where the waste tyres are typically stored by informal used tyre dealers.



**Figure 4-6: Storage of the waste tyres**

Different methods of storing the tyres in the informal waste tyre stores are applied across Emalahleni Local Municipality. According to the interview results, these include storing the waste tyres on site (i.e., at the site used for sale) (20%), at home (within the operator’s house/yard, normally in a shed or garage) (40%), a warehouse (20%) and storeroom (20%). The four (40%) respondents who reported that they store their tyres at home included used tyre dealers operating from their own yards/houses (Site I) and those who operate from mobile structures (shade netting) and under trees, who transport their tyres to and from home every day (Figure 4-6).

The research did not include observations on the storage of waste tyres outside of operating hours. The *Waste Tyre Regulations* (DEA, 2017) clearly stipulates conditions for the stacking and storage of waste tyres, mainly with the objective of preventing fires, or providing for adequate firefighting measures, should a fire occur. Care should, therefore, be taken during the storage of waste tyres, to prevent the risk of fire.

When asked about the provision for fire prevention/management, six (60%) of the used tyre dealers indicated that they do have a fire management plan. No such plans were, however, provided to the researcher at the time of performing this research. A fire extinguisher was observed at one of the used tyre dealerships. Three of the respondents (30%) indicated that they did not have any fire management plans in place. They indicated that they believed that *“it [a fire] is unlikely to happen and if it were to happen, we would race to move them [the tyres] to a new*

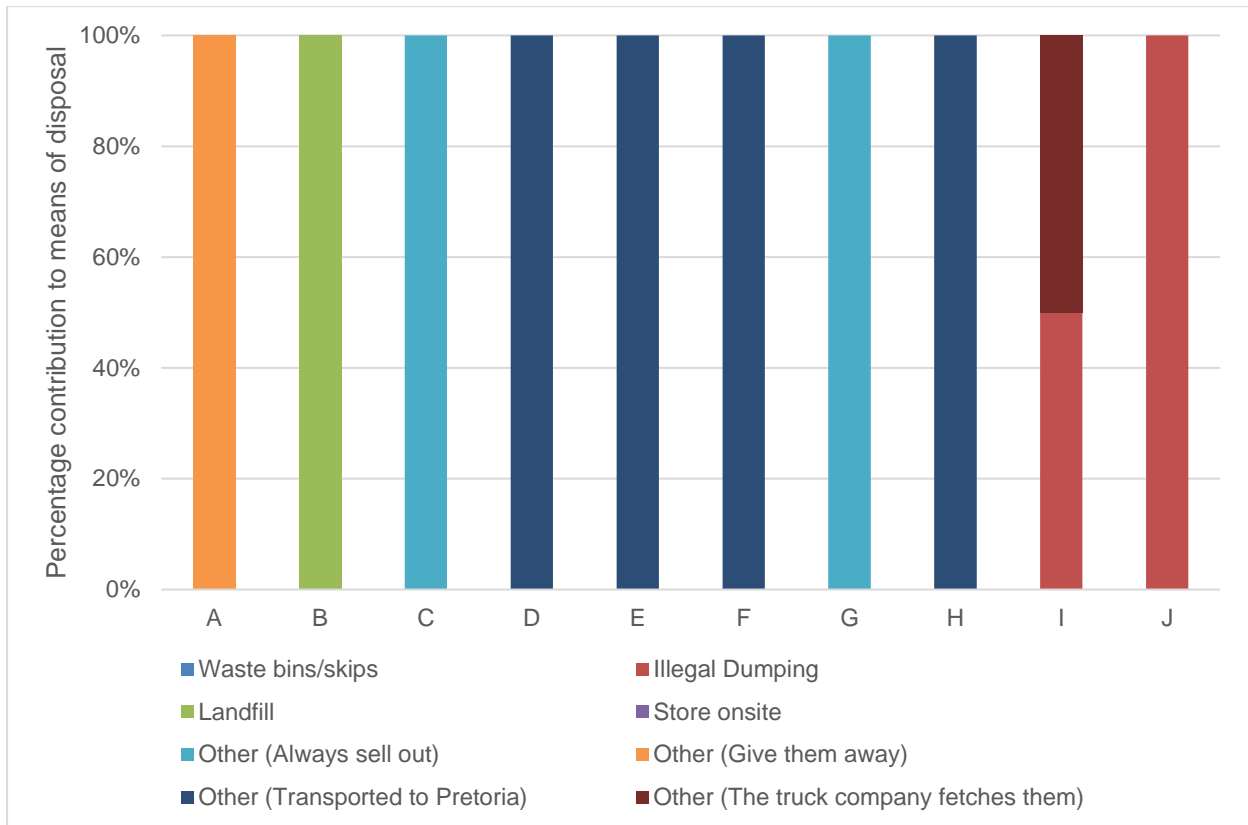
*location*". One of the respondents indicated that they were unsure if there is any plan when the question was posed.

Moreover, the storage of waste in the informal waste sector is a crucial aspect of waste management practices. Informal waste workers often face challenges related to storage, impacting their efficiency and overall waste management outcomes. According to a report by Scheinberg *et al.* (2010), inadequate storage facilities in the informal sector can lead to environmental and health hazards. Informal waste workers might lack proper infrastructure for the temporary storage of collected materials, exposing them to safety risks and hindering their ability to sort and process waste effectively (Medina, 2000). Integration of improved storage practices is essential to enhance the overall efficiency of the informal waste sector. In some cases, community-based initiatives and collaborations with local authorities have been successful in establishing shared storage facilities for informal waste workers, contributing to better waste handling practices (Scheinberg *et al.*, 2010). It is crucial for policies and interventions to address these storage challenges to promote a safer and more sustainable informal waste sector.

#### **4.3.7 Disposal of unsold waste tyres**

Illegal dumping of waste tyres is a common problem in South Africa (Nkosi *et al.*, 2013). As mentioned earlier, the disposal of waste tyres to landfill is prohibited in South Africa, in accordance with GNR. 636 *Norms and Standards for Disposal of Waste to Landfill*. This may present challenges regarding the disposal options to discard unsold waste tyres, which may lead to unlawful or unsafe disposal practices, such as illegal dumping, or burning of waste tyres (Muzenda & Popa, 2015).

Figure 4-7 illustrates the means through which informal used tyre dealers dispose of unsold waste tyres. It should be noted that this research relied on self-reported practices, and that the reported means of disposal may differ from the actual means of disposal.



**Figure 4-7: Disposal of informal unsold tyres**

The majority of used tyre dealers (40%) reported that they provide their tyres to company/person who transports the waste tyres to Pretoria. These were the four tyre dealers (Site D, E, F and H) located in close proximity to one another in Kwa Guqa. The company/person apparently sends out a truck to collect unsold waste tyres. The informal used tyre dealers did not have any knowledge of what happens to the waste tyres after collection and delivery to Pretoria. One of the used tyre dealers (Site I) also mentioned that when a driver (i.e. trucks) changes tyres, they send out someone to collect the old/damaged tyre which had to be changed after a new one has been bought from the informal waste tyre dealerships (Figure 4-7).

Two of the used tyre dealers (Sites C and G) mentioned that they “do not have any waste tyres to deal with, because everything is sold out”. These sites are located in Ogies and Phola (Table 4-1), receiving frequent customers, and were also the dealerships employing the highest number of employees (See Figure 4-5). Both of these used tyre dealerships mostly sell to motor vehicle drivers and taxi drivers (See Figure 4-2).

Sites I and J, located in Kriel and Thubelihle, reported that the common practice of disposing unsold waste tyres was dumping in open areas (Figure 4-7). This was also the most common

means of discarding unsold waste tyres reported by informal used tyre dealers included in the research of Schenk *et al.* (2023).

One of the informal used tyre dealers (Site B) reported that they take them to a landfill site. The name of the landfill site was not disclosed. Another participant (Site A) reported that when tyres are no longer of any use to them, they simply give them away to people who burn them and sell them (Figure 4-7).

It was noteworthy that none of the participants mentioned REDISA or the Waste Bureau. In the research by Schenck *et al.* (2023) some of their participants made mention of waste tyre collection by REDISA who collects waste tyres for storage at waste tyre depots.

The disposal of waste in the informal waste sector is a critical aspect of waste management practices, and it often involves challenges related to environmental sustainability and public health. Informal waste workers typically face difficulties in proper waste disposal due to limited infrastructure and resources (Medina, 2008). In many developing countries, informal waste workers play a significant role in waste collection but may resort to open dumping or burning of waste, leading to adverse environmental impacts (Wilson & Velis, 2015). This practice poses risks to both the workers' health and the surrounding communities. Efforts to improve the disposal of waste in the informal sector may include interventions such as providing training on environmentally friendly disposal methods, integrating informal workers into formal waste management systems, and establishing community-based waste disposal facilities (GIZ, 2019).

#### **4.3.8 Monthly income in the informal waste tyre stores**

Figure 4-8 outlines the monthly income generated by the informal used tyre dealerships across Emalahleni Local Municipality. The reported monthly income ranged from R2500 to R18 000 per month, with an average monthly income of R10 250 per month (Figure 4-8). The research by Schenck *et al.* (2023) did not investigate monthly income and no comparison is, therefore, made to their research. Research by Yu *et al.* (2020) on waste pickers in South Africa, indicated that waste pickers (working with general municipal waste) earn approximately R2 900 per month. The average monthly income reported by informal used tyre dealers in Emalahleni are comparatively higher. According to a study done by Mahopo *et al.*, (2022) focusing on street vendors' operations in the rural regions of South Africa, it was found that street vendors earn a profit of approximately R3 200 per month, on average. The informal tyre dealers earned relatively high monthly incomes when compared to other informal traders and waste pickers.



**Figure 4-8: Monthly income of informal used tyre dealers**

Site C and G in Ogies and Phola, who reported that they sell out (See Section 4.3.7) and also employed the largest number of employees (see Section 4.3.5) were the two informal used tyre dealerships who reported the highest monthly income of R17 000 and R18 000, respectively. Site A (located next to an Engen filling station in Leybank) reported the lowest monthly income of R2500. Respondents noted that customers are often not satisfied with the quality of the tyre after purchasing and return it and demand refunds. They also indicated that “*Some customers sometimes stop us (cancel the transaction) after having agreed to pay a certain amount for a tyre after they see the equipment that we use to change/replace the tyres*”. Responses indicated that customers often complain that they will damage the rims and should rather cease the task. It was also reported that a day can go by where no income is generated at all (Site A, Site F and Site J).

The status of the informal waste tyre sector mainly falls under low to middle class income, and the majority of the informal used tyre dealers live in poverty (Schenck & Blaauw, 2011; Velis, 2017). Informal waste workings are supporting families with large numbers of people depending on them (Scheck & Blaauw, 2011).

Income in the informal waste sector is a crucial aspect of understanding the livelihoods of those engaged in waste management activities. Informal waste workers often face economic challenges, with income fluctuations and uncertainties impacting their well-being (Medina, 2008). Research by Wilson and Velis (2015) highlights that informal waste workers may experience low and unstable incomes due to the informal nature of their work and the dependence on market prices for recycled materials. The lack of job security and social protections further contribute to

the economic vulnerability of these workers. Efforts to improve income in the informal waste sector may involve initiatives such as formalising and integrating informal workers into waste management systems, providing training for skill enhancement, and advocating for fair pricing structures (Scheinberg *et al.*, 2010). Addressing income disparities in the informal waste sector is crucial for promoting social equity and improving the overall well-being of individuals engaged in waste management activities.

#### **4.4 Results related to RO3: Explore perceptions on integrating/including informal waste tyre dealers as part of the formal waste tyre sector**

The third, and final, research objective explored the perceptions of both the informal- and formal waste tyre sectors in Emalahleni regarding integrating or including informal used tyre dealers as part of the formal waste tyre sector. Role-players in the formal waste tyre sector included formal tyre dealerships from Emalahleni, the local municipality, the CSIR, TIASA, as well as a tyre processing and waste treatment facility. The formal waste tyre sector had diverse responses regarding the integration of the informal tyre dealers. Although the formal sector recognises the positive contribution this sector provides for the livelihoods of the informal tyre dealers, the negative impacts to the socioeconomic communities, road safety and inability of the formal industry to aid cannot be ignored and therefore hinders the willingness to integration.

As explained in Section 3.4.2, interviews were conducted with ten informal used tyre dealers and ten participants from the formal waste tyre sector. Section 4.4.1 reports the findings of the closed Likert-style statements, while Section 4.4.2 outlines the main findings from open-ended questions.

##### **4.4.1 Responses to Likert-style statements**

Section B of Annexure B (informal used tyre dealer questionnaire) and Section B of Annexure A (formal used tyre dealer questionnaire) posed statements regarding the contribution of the informal waste tyre sector and statements regarding its possible integration into the formal waste tyre sector. Similar questions were posed to the informal used tyre dealers and to role-players in the formal waste tyre sector to allow for comparison between responses from the different groups. Some unique questions were also asked to the informal used tyre dealers only, and the formal waste sector only.

Responses to questions were measured by means of a Likert-scale (as explained in Section 3.4.2), where 1 = strongly agree, 2 = agree, 3 = neutral, 4 = disagree and 5 = strongly disagree. The level of agreement to the questions/statements posed is indicated in Table 4-2.

**Table 4-2: Statements related to the contribution and integration of the informal waste tyre sector**

<b>Statements and level of agreement</b>				
<b>S1. Informal waste tyre management/dealers present challenges in South Africa.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
<i>Responses of the <b>informal</b> used tyre dealers</i>				
0 (0%)	0 (0%)	20 (20%)	30 (30%)	5 (50%)
<i>Responses of the <b>formal</b> waste tyre sector</i>				
5 (50%)	2 (20%)	1 (10%)	2 (20%)	0 (0%)
<b>S2. I believe that the informal waste tyre sector makes a positive contribution to the sound management of tyres in South Africa.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
<i>Responses of the <b>informal</b> used tyre dealers</i>				
0 (0%)	9 (90%)	1 (10%)	0 (0%)	0 (0%)
<i>Responses of the <b>formal</b> waste tyre sector</i>				
0 (0%)	0 (0%)	1 (10%)	50 (0%)	4 (40%)
<b>S3. I believe that the informal waste tyre sector makes a positive contribution to the livelihoods of informal waste dealers in South Africa.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
<i>Responses of the <b>informal</b> used tyre dealers</i>				
2 (20%)	8 (80%)	0 (0%)	0 (0%)	0 (0%)
<i>Responses of the <b>formal</b> waste tyre sector</i>				
2 (20%)	6 (60%)	0 (0%)	1 (10%)	1 (10%)
<b>S4. I believe that the informal waste tyre sector makes a positive socio-economic contribution to communities.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
<i>Responses of the <b>informal</b> used tyre dealers</i>				
3 (30%)	7 (70%)	0 (0%)	0 (0%)	0 (0%)
<i>Responses of the <b>formal</b> waste tyre sector</i>				
0 (0%)	2 (20%)	0 (0%)	4 (40%)	4 (40%)
<b>S5. I believe that informal used tyre dealers should be integrated into the formal waste tyre sector in South Africa.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
<i>Responses of the <b>informal</b> used tyre dealers</i>				
5 (50%)	5 (50%)	0 (0%)	0 (0%)	0 (0%)
<i>Responses of the <b>formal</b> waste tyre sector</i>				
0 (0%)	6 (60%)	1 (10%)	1 (10%)	2 (20%)

<b>Statements and level of agreement</b>				
<b>S6. I believe that integration of informal used tyre dealers could be advantageous to the formal waste tyre sector.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
<i>Responses of the <b>informal</b> used tyre dealers</i>				
4 (40%)	6 (60%)	0 (0%)	0 (0%)	0 (0%)
<i>Responses of the <b>formal</b> waste tyre sector</i>				
0 (0%)	7 (70 %)	1 (10%)	0 (0%)	2 (20%)
<i>Question posed to the <b>informal</b> used tyre dealers only</i>				
<b>S7. I do not feel threatened running my used tyre dealership.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
0 (0%)	2 (20%)	6 (60%)	2 (20%)	0 (0%)
<i>Question posed to <b>formal</b> waste sector only</i>				
<b>S8. My organisation has sufficient knowledge and experience with informal used tyre dealers in South Africa.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
2 (20%)	0 (0%)	2 (20%)	5 (50%)	1 (10%)
<b>S9. My organisation could play a role towards supporting the integration of informal used tyre dealers into the formal waste tyre sector in South Africa.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
2 (20%)	2 (20%)	2 (20%)	2 (20%)	2 (20%)
<b>S10. My organisation has the capacity to assist with the integration of informal used tyre dealers into the formal waste tyre sector in South Africa.</b>				
<b>1: Strongly Agree</b>	<b>2: Agree</b>	<b>3: Neutral</b>	<b>4: Disagree</b>	<b>5: Strongly Disagree</b>
0 (0%)	0 (0%)	2 (20%)	6 (60%)	2 (20%)

The first statement (S1) investigated respondents' perceptions regarding informal waste tyre management/dealers presenting challenges in South Africa. Divergent opinions emerged from the two different groups. Eight of the ten (80%) informal used tyre dealers disagreed or strongly disagreed with the statement, while the majority of respondents from the formal tyre sector (70%) agreed or strongly agreed with the statement (Table 4-2). It is, therefore, clear that while the informal used tyre dealers did not consider their activities to present challenges, the formal tyre sector felt differently. Common challenges reported in literature include the unlawful sale of damaged or unroadworthy waste tyres, the sector being unregulated, the illegal disposal of waste tyres, to name a few (Schenck *et al.*, 2023).

Divergent opinions also emerged when respondents were requested to reflect on the following statement: "I believe that the informal waste tyre sector makes a positive contribution to the sound management of tyres in South Africa" (S2). While 90% of the informal used tyre dealers agreed

with the statement, 90% of the participants from the formal tyre sector disagreed (50%) or strongly disagreed (40%) with the statement (Table 4-2).

Respondents from both groups were, generally, in agreement about the perception that the informal waste tyre sector making a positive contribution to the livelihoods of informal waste dealers (S3). All of the informal used tyre dealers agreed (80%) or strongly agreed (20%) with the statement, while 80% of the formal tyre sector participants agreed or strongly agreed with the statement (Table 4-2). The believe that the informal waste tyre sector is making a positive contribution to the livelihoods of informal waste dealers in South Africa is supported by the discussions in Section 4.3.8 on the monthly income of used tyre dealers, and Section 4.3.5 on the number of people employed by the used tyre dealerships investigated in Emalahleni.

It was surprising to note that although the formal tyre sector agreed to the contribution to livelihoods of the used tyre dealers, they did not believe that the informal waste tyre sector makes a positive socio-economic contribution to communities (S4). Eight of the ten (80%) formal tyre sector participants disagreed or strongly disagreed with the statement. It may be that they consider the benefits (livelihoods) accruing to the informal used tyre dealers only, with limited benefits to the larger socio-economic contributions of the communities at large. Conversely, all of the informal used tyre dealers strongly agreed (30%) or agreed (70%) that they believed that the informal waste tyre sector makes a positive socio-economic contribution to communities (Table 4-2).

Statement 5 and Statement 6 (Table 4-2) posed statements regarding integration of the informal waste tyre sector. While all of the informal used tyre dealers agreed (50%) or strongly agreed (50%) that informal used tyre dealers should be integrated into the formal waste tyre sector in South Africa (S5), the formal waste sector had mixed views. While 60% of formal tyre sector respondents agreed to the statement, 30% of the respondents disagreed (10%) or strongly disagreed (20%) (Table 4-2). Similarly, all of the informal used tyre dealers agreed (60%) or strongly agreed (40%) (Table 4-2) that integration of informal used tyre dealers could be advantageous to the formal waste tyre sector (S6). Seven of the ten (70%) respondents from the formal waste tyre sector agreed to this statement, while two (20%) strongly disagreed (Table 4-2). As mentioned earlier, the informal waste tyre sector is currently excluded from the Industry Waste Tyre Management Plan developed for South Africa.

Statement 7 was posed to the informal used tyre dealers only. The statement aimed to determine whether informal used tyre dealers felt threatened while operating their informal used tyre dealerships. The majority of participants (60%) reacted neutral to the statement. Two of the participants (20%) indicated that they did feel threatened operating their informal used tyre

dealership. The reasons for responses were not explored. It may be due to aspects related to crime and safety in the areas where these informal dealers operate (Porrás Bulla *et al.*, 2021) or to aspects related to conflict with the formal tyre sector (Nkosi *et al.*, 2013).

Statements 8, 9 and 10 were posed to the formal tyre sector participants only. The objective behind the statements was to investigate the role that the formal waste sector may play towards supporting/integrating the informal used tyre dealers. The majority of respondents (60%) disagreed or strongly disagreed with S8 stating that *“My organisation has sufficient knowledge and experience with informal used tyre dealers in South Africa”*. Two of the respondents reacted neutral to the statement, while two respondents strongly agreed to the statement (Table 4-2). Respondents had mixed feelings regarding the role that their organisation may play towards supporting the integration of informal used tyre dealers into the formal waste tyre sector in South Africa (S9). An equal number (two per statement) strongly agreed, agreed, felt neutral, disagreed and strongly disagreed to this statement. Views towards Statement 10, *“My organisation has the capacity to assist with the integration of informal used tyre dealers into the formal waste tyre sector in South Africa”* were stronger. The majority of participants (80%) disagreed (60%) or strongly disagreed (20%) with the statement (Table 4-2).

In summary, the responses to the statements posed in Table 4-2 indicates that:

- While informal used tyre dealers do not believe that they pose a challenge towards waste management in South Africa, the formal tyre sector largely believe that they do;
- Informal used tyre dealers believe that they contribute towards waste tyre management, their livelihoods and the socio-economic status of communities in general; while the formal tyre sector believes that their contributions are largely towards their own livelihoods; and
- While the informal used tyre dealers are generally willing to be incorporated into the formal tyre sector, the integration of informal used tyre dealers and rendering support towards integration, is not supported by formal tyre sector participants.

#### **4.4.2 Responses to open-ended questions**

Different open-ended questions were posed to informal used tyre dealers and formal tyre sector participants.

Section C of Annexure B (informal used tyre dealer questionnaire) posed two questions:

- In your opinion, should informal used tyre dealers be integrated into the formal waste management sector in South Africa (please motivate your answer)?; and
- What assistance would you require from the formal waste/tyre sector, if you were to be integrated?

Section C of Annexure A (formal tyre sector questionnaire) posed three open-ended questions:

- In your opinion, what are the challenges/disadvantages of informal used tyre dealers in South Africa (in general)?
- In your opinion, what are the benefits/advantages of informal used tyre dealers in South Africa (in general)?
- In your opinion, should informal used tyre dealers be integrated into the formal waste management sector in South Africa (please motivate your answer)?

Section 4.4.2.1 provides the opinions of both the informal and formal tyre sector participants regarding integration of informal used tyre dealers. Section 4.4.2.2 outlines the responses of the informal used tyre dealers as it relates to assistance/support required by them from the formal tyre and waste sectors. Finally, Sections 4.4.2.3 and 4.4.2.4 discusses the challenges (disadvantages) and benefits (advantages) of the informal used tyre dealers in South Africa as perceived by the formal tyre respondents.

#### **4.4.2.1 Opinions on integration of informal used tyre dealers**

The informal tyre dealers were generally positive towards integration and willing to integrate as part of the formal tyre or waste tyre sectors. The general feeling from informal tyre dealers were that they did not feel threatened by the formal tyre/waste sectors and felt that they could make a contribution towards managing waste tyres in South Africa. One of the respondents mentioned that *“I think we can help reduce the illegal dumping of tyres that can still be used.”*

Mixed responses were received from the formal waste regarding integrating the informal tyre dealers into the formal waste tyre sector. The formal waste tyre sector was more reluctant to the integration of the informal used tyre dealers as compared to the informal used tyre dealers due to various reasons. These reasons include concerns about unsafe/unroadworthy tyres on the road (safety issues), competition and customer poaching, environmental concerns such as waste management, as well as apprehensions regarding unsafe working conditions for the informal used tyre dealers. They also frequently mentioned that the informal used tyre dealers have no accountability for the dangers and risks that they are posing socially and environmentally. One of the respondents mentioned that: *“I see no benefits building a plan around informal waste dealers, we need scale which they cannot provide for long term sustainability.”*

However, there was also positive feedback, and the formal sector mentioned aspects such as a “contribution to livelihoods” and a “reduction in the dumping of waste tyres” in the region. One of the formal tyre dealership respondents said: *“I think they should be integrated as they are helping out with waste tyre management”*. Informal waste management operations also assist municipalities in meeting recycling goals and conserving landfill space (Gupta, 2012). This

sentiment was shared by one of the municipal officials, who mentioned *“We had a lot of problems with illegal disposal of tyres on our landfill sites. I think these guys [informal tyre dealers] make a difference in terms the number of tyres that end up in landfill sites”*.

There was a general uneasiness under the formal tyre/waste sector respondents in terms of what would be expected from them, as it relates to supporting integration of the informal waste tyre sector. The majority of the formal tyre/waste sector participants reported that their organisations do not have the means or capability to assist with the integration of the informal waste tyre sector. One of the respondents mentioned that they would be willing to provide basic training, such as environmental awareness, and how to manage and operate the industry. Respondents felt strongly that financial resources towards integration should be sourced from the government. One of the respondents from the formal sector mentioned that *“[I would support integration] if Government creates a platform that encourages recycling of waste tyres with the necessary incentives. If this happens longer term, sustainable jobs will be created”*.

#### **4.4.2.2 Assistance required by the informal waste tyre sector towards integration**

This section elaborates on the responses of informal waste tyre dealers when asked: *“What assistance would you require from the formal waste sector, if you were to be integrated?”* Only two themes/areas of support were identified by the informal waste tyre dealers: (1) financial assistance, and (2) appropriate infrastructure.

Financial support is the primary assistance required by majority of the informal tyre dealers (eight of ten, 80%). Responses included: *“It would help if we could get some money to develop our businesses”*, *“Funding would help us to buy better quality tyres for our shops”*, *“If I had more money, I would make my stand nice with some shade net and a table”*. The responses mostly indicated that informal tyre dealers would use funding support towards expanding or improving their businesses. The need for financial assistance correlates to the factors hindering business growth as reported by second-hand tyre dealers in the research by Schenk *et al.* (2023).

The second theme related to the improvement of infrastructure and equipment (also mentioned as the main reason for needing financial support, above). Six of the ten respondents (60%) mentioned that improved equipment would enable them to get access to *“more customers”* and be able to work *“at a speedy pace”* because the correct equipment and *“machinery is needed to remove and replace the tyres”*. One of the participants mentioned that: *“The customers want to buy tyres, but they stop us when they see the machinery we use, because they think we might damage their rims”*. Two of the respondents suggested that formal tyre dealerships should consider renting or selling their old (tyre changing) equipment to informal tyre dealers.

Five of the respondents also mentioned the need for improved storage and trading spaces. It was observed that most of the informal tyre dealers operated from make-shift, poor quality structures, with limited storage space (See Section 4.2.2 above). A respondent said that: *“If I can get a bigger space for all my tyres but right here where I am, I don’t want to move because my customers know they find me here even on Sunday”*. Another respondent added *“Some of my tyres get stolen because I don’t have enough space to lock it away”*. Again, the results corresponded with the findings of Schenck *et al.* (2023) where inadequate space, infrastructure and equipment were highlighted as barriers to business development.

#### **4.4.2.3 Challenges/disadvantages of informal used tyre dealers in South Africa as perceived by the formal tyre respondents**

The sub-sections below summarise the responses of formal tyre/waste sector respondents as far as challenges or disadvantages of the informal waste (used) tyre dealers are concerned.

##### 4.4.2.3.1 Health and safety concerns

The responses of eight of the ten (80%) formal respondents indicated that their main concern was regarding safety of road-users. Responses indicated that second-hand tyres which are sold are perceived to be “unfit for purpose” and “unroadworthy”. Unroadworthy tyres put the lives of road users in danger.

Respondents also expressed concerns around the unsafe working conditions of informal tyre dealerships. One of the respondents mentioned that: *“Tyres are stacked and stored in an unsafe manner. They are no fire prevention measures, and no regard for the Waste Tyre Regulations.”* Two of the respondents expressed concerns around the *“breeding of vectors, like rats, vermin and mosquitoes”*, while another respondent added that *“tyres that are abandoned by informal tyre dealers many times end up being burned by waste pickers to get access to the wire inside the tyre. The burning of the tyre presents a safety risk, but also a health risk to people exposed to emissions”*.

These concerns are supported in literature by authors such as Pickersgill (2018), Wright *et al.*, (2013) and Mbohwa and Krüger (2017). These studies expand on the integration of waste pickers into the formal sector, and explain how they have fostered the transaction of the waste industry while promoting the circular economy by providing a livelihood for communities.

##### 4.4.2.3.2 Limited accountability

Six of the formal sector respondents (60%) specifically raised concerns about the limited accountability that the informal waste tyre dealers have. Concerns raised specifically related to

*“no consequences for legal non-compliance”, “no accountability for not following codes of practice or law” and “lawlessness due to zero consequences”. Currently within the South African landscape, informal used tyre dealers are not registered as businesses, and they are excluded for the Draft Industry Waste Tyre Management Plan. They do not follow any codes of practice or guidelines with the operation of their industry, and they do not keep/submit any paperwork (such as waste manifests). One of the participants highlighted that: “There is no guarantee of the products [used tyres] sold. If customers are in an accident because of an unfit or damaged tyre, they cannot be held responsible nor liable for their actions”. Another respondent added that “Used tyre dealers cannot be fined for illegal dumping of tyres nor the incorrect disposal of tyres because they can simply deny it and walk away from any consequences”.*

Betancourt (2010) in his work on waste pickers in Bogotá also mentioned a lack of accountability as one of the challenges when integrating waste pickers into the formal waste system.

#### 4.4.2.3.3 Unsustainable industry

Sustainable jobs refer to sustainable growth in which social, environmental, and economic requirements are met (Knockaert & Maillefert, 2004). The perceptions of three (30%) formal sector respondents indicated that the informal tyre sector does not meet the requirements of a sustainable industry and are not regarded to provide sustainable job opportunities. One of the respondents mentioned that *“No real long terms sustainable jobs will be created without the assistance of the formal sector, particularly the government by providing incentives”.*

#### 4.4.2.3.4 Reputational risk

Lastly, two of the formal sector respondents (20%) were concerned about reputational risks to the tyre sector. One of the respondents mentioned that *“The public does not distinguish between us [formal tyre sector] and them [informal waste tyre dealers] when accidents happen. They will just think that ‘South Africa supplies poor quality tyres’, when they read about accidents because of damaged or poor tyres in the news”.*

#### **4.4.2.4 Benefits/advantages of informal used tyre dealers in South Africa as perceived by the formal tyre respondents**

The sub-sections below summarise the responses of formal tyre/waste sector respondents as far as benefits or advantages of the informal waste (used) tyre dealers are concerned.

#### 4.4.2.4.1 Repurposing waste and reducing the illegal dumping of tyres

Six of the ten formal sector respondents (60%) mentioned that informal tyre dealers play a positive role towards repurposing waste tyres and reducing the illegal dumping of tyres. As mentioned previously, the disposal of waste tyres to landfill has been prohibited in terms of GNR. 636 of August 2013. This has caused a surge in the illegal dumping of waste tyres. One of the respondents mentioned that: *“The informal used tyre dealers purchase used/ second hand tyres and resell them as a new product. That process can be identified as the repurposing of the waste tyres. This process solves many problems for the formal waste sector”*.

The value of informal waste pickers towards waste reduction in South Africa is well-recognised in the National Waste Management Strategy (DEFF, 2020) and the *Guideline for Waste Picker Integration* (DEFF & CSIR, 2020). Informal waste tyre dealers have, however, not enjoyed the same recognition. The contribution of second-hand tyre dealers towards the repurposing of tyres is acknowledged by Schenck *et al.* (2023).

#### 4.4.2.4.2 Promoting the circular economy

Four (40%) of the participants acknowledged informal tyre dealers’ *“contribution to the circular economy”*. Instead of the tyres becoming waste, they are resold as used or second-hand tyres or fixed then sold as second-hand tyres. One of the respondents highlighted that *“Informal waste tyre dealerships reduce the tyre-related waste and encourages the cradle-to-cradle movement”*.

#### 4.4.2.4.3 Affordable and readily available tyres

Two of the formal sector respondents (20%) mentioned that informal tyre dealers provide *“cheap”* and *“easily accessible tyres”* that *“more people can afford”*. A respondent added that *“It is also convenient for customers, and they can simply go to the informal waste tyre stores and purchase the tyres. The industry has no off days and are available to assist even during Sundays and public holidays”*. The respondent, however, cautioned that *“the convenience factor should be considered hand-in-hand with the safety factor”*. The second respondent mentioned that *“It is especially beneficial if the tyres are not being used for purposes of driving and used for making of furniture or other objects from tyres”*. Again, highlighting concerns about safety versus affordability and availability.

## 4.5 Chapter summary

Chapter 4 presents the results and discussions of the research. Chapter 5 provides the conclusions and recommendations as well as areas for future research.

## CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Introduction

According to a study by Wilson *et al.* (2018), the informal waste sector significantly contributes to waste recycling and resource recovery in many developing countries. Additionally, the work of informal waste workers has been acknowledged for its environmental and economic benefits, reducing the overall volume of waste sent to landfills and contributing to job creation (Schübeler, 2017).

This research aimed to investigate the perceptions on integrating informal used tyre dealers into the formal waste sector, with Emalahleni Local Municipality in South Africa, as a case study area. For this purpose, an exploratory qualitative approach was followed involving observations and interviews with informal used tyre dealers (ten respondents) and role-players from the formal tyre sector (ten respondents) to address the following objectives:

- **Research objective 1:** To identify and describe the informal waste tyre sector in the Emalahleni Local Municipality.
- **Research objective 2:** To characterise informal waste tyre dealers in the Emalahleni Local Municipality.
- **Research objective 3:** To explore perceptions on integrating/including informal waste tyre dealers as part of the formal waste tyre sector in the Emalahleni Local Municipality.

Section 5.2 provides the conclusions to each of the research objectives, while Section 5.3 provides recommendations towards informal used tyre dealer integration, as well as recommendations for future research.

### 5.2 Conclusions

Sections 5.2.1 to 5.2.3 provides the conclusions of the research as it relates to each of the research objectives.

#### 5.2.1 Conclusions related to RO1: To identify and describe the informal waste tyre sector in the Emalahleni Local Municipality

Observations were used to identify and describe the informal used tyre dealers in Emalahleni Local Municipality. At the time of the research, ten informal used tyre dealers were operating in and around Emalahleni. Apart from the CBD of Emalahleni and townships surrounding Emalahleni, locations also included areas located within the larger municipal area, such as Kriel,

Phola, Ogies and Springbok. Repeating patterns with the location of the stores were observed, with the majority of informal tyre dealerships located outside of town, next to main roads, such as the R544, R547 and R555. The locations were in close proximity to formal commercial activities, such as filling stations, shopping centres and truck yards; or in busy areas located in townships (in areas frequently used by vehicles and taxis) to increase their potential customer base. Four of the sites were located in close proximity to one another (in a less than 1 km radius). Similarly, Schenck *et al.* (2023) indicated an area in Pretoria (Marabastad) where fourteen informal used tyre dealers were operating. The negative impact of such closely situated/crowded location of used tyre dealerships is market saturation and competition, as highlighted by Makaluza and Burger (2018).

Informal used tyre dealerships exhibited distinct characteristics, often lacking formal structures, and conducting operations beneath a tree or makeshift shade cloth/net. Alternatively, when situated near the dealer's residence, these businesses utilised informal structures. Typically, these establishments strategically positioned themselves in easily accessible locations that attracted high volumes of traffic from various vehicles, taxis, and trucks. Additionally, their proximity to open areas, residential zones, or other informal commercial spaces contributed to their visibility and accessibility.

A notable observation was the dynamic nature of informal used tyre dealerships without formal structures. These mobile setups would shift within the same area, adapting their exact locations based on the level of activity in order to maximise exposure to potential customers.

Furthermore, the characteristics of informal used tyre dealerships often revealed collaborative efforts with other informal businesses. Partnerships were observed with enterprises engaged in furniture sales, vehicle fixing and spray-painting, as well as the sale of vehicle parts and hub caps for wheels. This interconnectedness underscored the versatility and adaptability of informal used tyre dealerships, demonstrating their integration into broader informal economic networks.

These characteristics of informal used tyre dealerships concur with the research by Scheck *et al.* (2023), which found that dealerships were often located at the corners of streets, with limited operating and storage space, mostly making use of informal, mobile, make-shift (temporary) structures, providing limited protection against natural elements such as sunlight and rain.

The implications of the close proximity of informal used tyre dealerships to formal commercial activities, as well as their clustering in busy areas, are twofold for these businesses. On the positive side, the strategic placement near high-traffic zones, including filling stations, shopping centres, and truck yards, or in busy townships, aims to maximise their potential customer base.

However, the downside, as highlighted by Makaluza and Burger (2018), is the risk of market saturation and heightened competition in densely populated locations. Additionally, the reliance on informal, mobile, and makeshift structures with limited access control and protection against natural elements, further underscores the vulnerability of these businesses to environmental factors, and criminal activities.

### **5.2.2 Conclusions related to RO2: To characterise informal waste tyre dealers in the Emalahleni Local Municipality**

The second research objective focused on key aspects of informal used tyre dealers, covering sources of waste, market dynamics, pricing, income levels, business duration, employment, storage practices, and unsold tyre disposal.

All ten dealers exclusively sourced tyres from formal dealerships, a practice at odds with the Waste Tyre Regulations (DEA, 2017) and aligned with Schenck *et al.*'s (2023) findings, where nearly 60% of respondents identified formal dealers as their primary source. Interviews highlighted the diverse market, with motor vehicle and taxi drivers being the primary customers, aligning with Schenck *et al.* (2023).

Prices, determined by factors like size and condition, varied from R300 to R600, with an average monthly income of R10 250, which is notably higher than that reported for waste pickers dealing with general municipal waste in South Africa (Yu *et al.*, 2020).

Informal used tyre dealers operated for an average of 8.8 years, slightly surpassing Schenck *et al.*'s (2023) average of 7.3 years. The dealerships employed an average of two people, aligning closely with the 2.1 persons per dealership reported by Schenck *et al.* (2023).

Challenges related to equipment, storage, and fire management, and disposal methods for unsold tyres included providing them to companies, dumping, landfilling, or giving them away, also resonated with the findings of Schenck *et al.* (2023). However, limited engagement with established waste management entities like REDISA or the Waste Bureau contrasts with Schenck *et al.*'s (2023) findings.

The findings from the study on informal used tyre dealers in Emalahleni reveal several implications for this sector in South Africa. Firstly, the predominant reliance on formal tyre dealerships for their supply contradicts *Waste Tyre Regulations* (DEA, 2017), highlighting a potential need for increased awareness and adherence to regulatory standards – both by the formal and informal waste tyre sectors. The diverse customer base, including motor vehicle, taxi, and truck drivers, emphasises the adaptability of these dealerships but also raises concerns, as

discussed by Muzenda and Popa (2015), about the use of non-roadworthy tyres by motor vehicles.

The pricing dynamics, influenced by factors like size and condition, underscore the complexity of the informal waste industry and its vulnerability to market demand and commodity price fluctuations. The notably higher average monthly income of informal used tyre dealers compared to waste pickers dealing with municipal waste suggests economic viability, but challenges such as income disparities, customer dissatisfaction, and transaction cancellations underscore the need for initiatives like formalisation, skills training, and fair pricing structures to enhance the sector's sustainability and the well-being of its participants.

The extended operational time of the dealerships, averaging 8.8 years, signifies their resilience but also prompts consideration of long-term strategies for growth and sustainability. The employment landscape, with an average of 2 persons per dealership, aligns with Schenk *et al.*'s (2023) findings, suggesting potential avenues for job creation and poverty reduction through formalisation efforts.

Challenges related to equipment and storage resonate with previous research, pointing out the need for infrastructure improvements and compliance with regulations. The disposal practices, including unknown fates of tyres provided to companies and instances of dumping, underline a need for increased engagement with established waste management entities to ensure responsible and sustainable waste disposal practices within the informal waste tyre sector.

### **5.2.3 Conclusions related to RO3: To explore perceptions on integrating/including informal waste tyre dealers as part of the formal waste tyre sector**

The study reveals divergent perspectives between informal used tyre dealers and the formal tyre sector on various aspects related to the informal waste tyre management sector in South Africa. While 80% of informal dealers disagreed that their activities presented challenges, 70% of the formal tyre sector participants perceived challenges in the sector. A significant divide also emerged regarding the positive contribution of the informal waste tyre sector to the overall management of tyres in South Africa. Interestingly, both groups acknowledged the positive impact on the livelihoods of informal waste dealers, but the formal sector was sceptical about the sector's broader socio-economic contributions to communities.

Integrating the informal sector into the formal waste tyre industry garnered mixed responses from the formal sector, highlighting a need for more inclusive strategies. Additionally, while informal dealers mostly felt neutral about feeling threatened while operating, further investigation is required to understand the reasons behind this sentiment. The formal sector expressed

uncertainty and limitations in their knowledge, experience, and capacity to support the integration of informal used tyre dealers, emphasising the necessity for improved collaboration and supportive measures. Overall, the findings underscore the complexity of perspectives within the waste tyre ecosystem and highlight the need for enhanced communication and collaboration between formal and informal sectors.

Responses on open-ended questions, similarly, revealed a generally positive stance from the informal sector, with a willingness to integrate into the formal tyre or waste tyre sectors. Informal dealers see themselves as contributors to waste tyre management in South Africa, aiming to reduce illegal dumping. However, the formal waste tyre sector exhibits mixed responses, with concerns ranging from safety issues and competition to environmental worries and perceived lack of accountability from informal dealers. Despite some positive feedback emphasising contributions to livelihoods and waste reduction, there is a prevailing uneasiness among formal sector respondents regarding expectations and support for integration. Many feel that governmental resources should be the primary means of facilitating integration, suggesting a need for policy frameworks and incentives to ensure long-term sustainability and job creation.

The informal waste tyre dealers overwhelmingly expressed a need for two types of support for integration: financial assistance and improved infrastructure. Financial support, identified as the primary requirement by 80% of respondents, was seen as crucial for business development, including expanding operations and enhancing the quality of products. The second theme emphasised the importance of upgraded equipment to attract more customers and operate efficiently. Additionally, the lack of proper storage and trading spaces was highlighted by five respondents, indicating a need for improved facilities to overcome barriers to business development identified in previous research.

The formal sector's concerns regarding the integration of informal waste tyre dealers primarily revolve around health and safety issues, with 80% expressing worries about the sale of perceived "unfit" and "unroadworthy" tyres endangering road users. Additionally, concerns were raised about unsafe working conditions, breeding of vectors, and the safety and health risks associated with burning abandoned tyres. Limited accountability among informal dealers was another significant concern for 60% of formal respondents, citing issues such as legal non-compliance, lack of consequences, and absence of registration or adherence to guidelines. Some formal sector participants also questioned the sustainability of jobs in the informal sector, and 20% expressed apprehension about reputational risks to the entire tyre industry in the event of accidents involving informal dealers' products.

Formal sector respondents identified several benefits of integrating informal waste tyre dealers, with 60% recognising their role in repurposing waste tyres and reducing illegal dumping. Participants acknowledged that informal dealers contribute to the circular economy by reselling or fixing tyres, as highlighted by 40% of respondents. Additionally, 20% of participants noted that informal dealers provide affordable and easily accessible tyres, making them a convenient option for more people, albeit with caution regarding safety considerations. The respondents emphasised the positive impact of informal tyre dealers in promoting sustainability and waste reduction, aligning with the principles of the circular economy.

Finally, the rephrasing from “informal waste tyre dealers” to “informal second-hand/used tyre dealers” should be considered. This may change the perceptions around informal tyre dealers and potentially allow for more positive perspectives around integration.

Integrating informal used tyre dealers into the formal waste sector in Emalahleni Local Municipality can have multiple benefits, but it requires careful planning, stakeholder engagement, infrastructure development, and enforcement. It is a complex process that should consider environmental, economic, and social factors, as well as the specific needs and challenges of the local community.

### **5.3 Recommendations and areas of future research**

Section 5.3.1 presents recommendations related to the research findings, while Section 5.3.2 suggests areas for further research.

#### **5.3.1 Recommendations**

The following recommendations are made for creating a more feasible landscape towards integrating the informal waste tyre sector in South Africa:

***Regulatory awareness and adherence:*** The most frequently mentioned concerns regarding integration of the informal waste tyre sector related to their unlawful sale of unroadworthy tyres. Finding a means to provide informal used tyre dealers with opportunities to buy and sell tyres within a legal market (i.e., selling only roadworthy tyres, or selling unroadworthy tyres only for purposes other than driving, for instance use for play areas/furniture) is a first step towards facilitating integration. Efforts should be made to increase awareness and adherence to the Waste Tyre Regulations (2017) among both formal and informal waste tyre sectors to ensure compliance with standards, particularly regarding the sourcing of waste tyres. The sale of unroadworthy and damaged tyres should be entirely prohibited, since dealing in such tyres are illegal and unsafe.

**Long-term planning and growth strategies:** Programmes could be developed to support informal used tyre dealers in developing long-term growth strategies, considering the challenges of market saturation and competition, possibly through business diversification or strategic relocation.

**Infrastructure improvement and compliance:** Investments should be made towards improvements of infrastructure of informal used tyre dealerships, providing proper storage facilities and testing centres to enhance operational efficiency and compliance with regulations. Initiatives should be developed and implemented to ensure proper equipment use, storage practices, and fire management, enhancing the overall safety and resilience of informal used tyre dealers.

**Engagement with established entities:** Increased engagement and communication should be facilitated between informal used tyre dealers and established waste management entities like the Waste Bureau to ensure responsible waste disposal practices and promote environmental sustainability. Avenues for collaboration and shared resources between informal and formal tyre sectors should also be explored, leveraging the strengths of both formal and informal sectors for more effective waste tyre management.

**Inclusive integration strategies:** Lastly, inclusive strategies for integrating informal used tyre dealers into the formal waste tyre sector should be encouraged, addressing concerns and uncertainties expressed by the formal sector and fostering a collaborative environment. Platforms for open communication and dialogue between formal and informal sectors should be established to enhance mutual understanding and address misconceptions. As a final suggestion, the Integrated Waste Tyre Management Plan should consider how it could provide for the integration of the informal waste tyre sector.

### **5.3.2 Areas for future research**

Beyond the scope of this study and the more recent investigation conducted by Schenck *et al.* (2023) in September 2023, there has been limited investigation of informal used tyre dealers and dealerships in South Africa. Echoing the sentiments of Schenck *et al.* (2023), studies are required to investigate informal used tyre dealers on a national scale. Considering the unique characteristics of different regions in South Africa, future research should adopt a regional perspective, examining how variations in local contexts influence the operations and challenges faced by informal used tyre dealers. This regional focus may inform tailored interventions and policies that address the specific needs of each locality.

Research towards understanding the mechanisms towards supporting the integration of informal used tyre dealers, (beyond perceptions) also exploring the policy context and limitations within South Africa, is advised.

Additionally, future research should delve into the social, environmental, and economic impacts of informal used tyre dealerships, both on individual livelihoods and broader community dynamics. Assessing the socio-economic contributions of these dealerships, beyond just income generation, can provide insights into their role in poverty alleviation and community development.

Lastly, given the observed divergence in perceptions between informal dealers and the formal tyre sector, further studies should explore strategies for fostering collaboration and integration. This could involve evaluating existing models of formal-informal sector partnerships, both within and outside the waste management domain, to identify best practices and potential challenges.

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# ANNEXURE A

## *Research Questions for the formal role-players in waste tyre management in South Africa*

Dear Sir/Madam

I appreciate your interest in our research project. Before joining, please carefully read the information provided.

### **Research title**

Perceptions on integrating informal waste tyre dealers into the formal waste sector: Emalahleni Local Municipality

### **Introduction**

My name is Nomthandazo Valentine Mhlanga, with student number 30733359. I am a registered student at North-West University for Masters in Environmental Management: Waste Management. My research focuses on "Perceptions on integrating informal waste tyre dealers into the formal waste sector: Emalahleni Local Municipality" under the supervision of Prof Claudine Roos.

This document serves as an invitation to participate in the study as a role player<sup>1</sup> in the waste management industry.

### **Purpose of the research**

The aim of the research is to explore perceptions on integrating informal waste tyre dealers into the formal waste sector, using Emalahleni Local Municipality as a case study. The research will focus on perspectives of informal waste tyre dealers, as well as stakeholders/role players from the formal waste sector.

### **Methodology of the study**

Interviews (guided by a structured questionnaire) will be conducted between the researcher and participant virtually (via MS Teams or Zoom). If it is not possible to meet virtually, the questionnaire will be e-mailed for completion.

Participants are more than welcome to contact the researcher should they need more clarification on the questions at [vallymhlanga54@gmail.com](mailto:vallymhlanga54@gmail.com).

### **Benefits of the research**

This research will add to the body of academic knowledge on the informal waste tyre sector including the practices, challenges and opportunities etc. – an area, which has not yet been extensively researched in South Africa.

### **Confidentiality**

All information will be kept anonymous and confidential for the purposes of reporting the results of this research.

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<sup>1</sup> Role players in the Waste Management Industry as identified by the IndWTMP (2022) include the following; Waste Management Bureau (WMB), Industry Advisory Committee (IAC), Department of Forestry, Fisheries and the Environment (DFFE), Department of Trade, Industry and Competition (DTIC), Auditor General, National Treasury, Controller at collection points, Operator at the tyre pre-processing facility, Transporters, Micro collectors of waste tyres, Operator of the depot or waste tyre storage site, Waste tyre processors and Tyre consumers (DFFE, 2022).

**Rights of participants**

Participation in this research is voluntary and participants may withdraw from the research at any point.

**Compensation**

No payment/compensation will be made to participants for taking part in the study.

**Ethical approval**

This research was approved by the Faculty of Natural and Agricultural Sciences Ethics Committee (NFAS-REC) of the North-West University Potchefstroom Campus. My ethics number is NWU-01227-23-A9.

**Participant consent**

I have read and understood this information document. My questions prior to answering the questionnaire have been answered to my satisfaction. I understand that I am free to request further information at any time.

I know and understand that:

1. My participation in the study is voluntary,
2. My personal information will be kept confidential,
3. I am free to withdraw from participating in the study at any time,
4. By signing this document, I agree to participate in the study.

Signature of participant:		Date:	
Printed name:			

## ANNEXURE B: A STRUCTURED SURVEY QUESTIONNAIRE

Please tick the appropriate boxes or write your answers in the spaces provided.

### Section A: Background

**1. Organisation/Department:**

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**2. Designation:**

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**3. Age:**

18 – 25		26 – 35		36 – 45		46 – 55	
56 – 65		>65					

**4. Gender**

<input type="checkbox"/>	Male
<input type="checkbox"/>	Female
<input type="checkbox"/>	Other

**5. Highest level of education:**

<input type="checkbox"/>	No formal education
<input type="checkbox"/>	Primary
<input type="checkbox"/>	Secondary
<input type="checkbox"/>	Tertiary

**6. Years of experience within your organisation:**

0 - 5		6 – 10		11 - 15	
16 - 20		>20			

**Section B: Likert statements: Please indicate your level of agreement (1) or disagreement (5) with the following statements:**

**1. Informal waste tyre management/dealers present challenges in South Africa.**

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

**2. I believe that the informal waste tyre sector makes a positive contribution to the sound management of tyres in South Africa.**

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

**3. I believe that the informal waste tyre sector makes a positive contribution to the livelihoods of informal waste dealers in South Africa.**

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

**4. I believe that the informal waste tyre sector makes a positive socio-economic contribution to communities.**

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

**5. The suggestion to prohibit informal waste tyre dealing in the Draft Industry Waste Tyre Management Plan (March 2022) is a good decision.**

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

6. I believe that informal waste tyre dealers should be integrated into the formal waste tyre sector in South Africa.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

7. I believe that integration of informal waste tyre dealers could be advantageous to the formal waste tyre sector.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

8. My organisation has sufficient knowledge and experience with informal waste tyre dealers in South Africa.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

9. My organisation could play a role towards supporting the integration of informal waste tyre dealers into the formal waste tyre sector in South Africa.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

10. My organisation has the capacity to assist with the integration of informal waste tyre dealers into the formal waste tyre sector in South Africa.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

**Section C: Open-ended questions**

1. In your opinion, what are the **challenges/disadvantages** of informal waste tyre dealers in South Africa (in general)?

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2. In your opinion, what are the **benefits/advantages** of informal waste tyre dealers in South Africa (in general)?

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4. In your opinion, should informal waste tyre dealers be integrated into the formal waste management sector in South Africa? (please motivate your answer)

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**Your time to participate in the study is truly appreciated!**

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## ANNEXURE B

### *Research Questions for the informal used tyre dealers in Emalahleni Local Municipality*

Dear Sir/Madam

I appreciate your interest in our research project. Before joining, please carefully read the information provided.

#### **Research title**

Perceptions on integrating informal waste tyre dealers into the formal waste sector: Emalahleni Local Municipality

#### **Introduction**

My name is Nomthandazo Valentine Mhlanga, with student number 30733359. I am a registered student at North-West University for Masters in Environmental Management: Waste Management. My research focuses on *"Perceptions on integrating informal waste tyre dealers into the formal waste sector: Emalahleni Local Municipality"* under the supervision of Prof Claudine Roos.

This document serves as an invitation to participate in the study as a role player<sup>1</sup> in the waste management industry

#### **Purpose of the study**

The aim of the research is to explore perceptions on integrating informal waste tyre dealers into the formal waste sector, using Emalahleni Local Municipality as a case study. The research will focus on perspectives of informal waste tyre dealers, as well as stakeholders/roleplayers from the formal waste sector.

#### **Methodology of the study**

Interviews (structured questionnaire) will be conducted between the researcher and participant physically and the participant will record the answers.

Participants are more than welcome to ask for clarity throughout the interview should they need more clarification on the questions.

#### **Benefits of the research**

This research will add to the body of academic knowledge on the informal waste tyre sector including the practices, challenges and opportunities etc. – an area, which has not yet been extensively researched in South Africa.

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<sup>1</sup> Role players in the Waste Management Industry as identified by the IndWTMP (2022) include the following: Waste Management Bureau (WMB), Industry Advisory Committee (IAC), Department of Forestry, Fisheries and the Environment (DFFE), Department of Trade, Industry and Competition (DTIC), Auditor General, National Treasury, Controller at collection points, Operator at the tyre pre-processing facility, Transporters, Micro collectors of waste tyres, Operator of the depot or waste tyre storage site, Waste tyre processors and Tyre consumers (DFFE, 2022).

**Confidentiality**

We shall rigorously maintain the privacy of any personal information. The names of the participants won't be mentioned or used in the report.

**Possible risk**

Participation in the study poses no risk to participants.

**Rights of participants**

It is optional to take part in the study. Participants are not penalized if they decide to stop taking part at any point.

**Compensation**

No payment will be made to participants for taking part in the study.

**Ethical approval**

This study was approved by the Faculty of Natural and Agricultural Sciences Ethics Committee (NFAS-REC) of the North-West University Potchefstroom Campus. My ethics number is NWU-01227-23-A9.

**Participant consent**

I have read and understood this information document. My questions prior to answering the questionnaire have been answered to my satisfaction. I understand that I am free to request further information at any time.

I know and understand that:

1. My participation in the study is voluntary,
2. My personal information will be kept confidential,
3. I am free to withdraw from participating in the study at any time,
4. By signing this document, I agree to participate in the study.

Signature of participant:		Date:	
Printed name:			

## ANNEXURE B: A STRUCTURED SURVEY QUESTIONNAIRE

Please tick the appropriate boxes or write your answers in the spaces provided.

### Section A: Socio-demographics

Tick only one box per question in Section A.

1. Gender:

Male	<input type="checkbox"/>	Female	<input type="checkbox"/>	Other	<input type="checkbox"/>	Prefer not to say	<input type="checkbox"/>
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2. Age:

18 – 25	<input type="checkbox"/>	26 – 35	<input type="checkbox"/>	36 – 45	<input type="checkbox"/>	46 – 55	<input type="checkbox"/>
56 – 65	<input type="checkbox"/>	>65	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

3. Ethnicity:

African	<input type="checkbox"/>	Asian	<input type="checkbox"/>	Coloured	<input type="checkbox"/>	Indian	<input type="checkbox"/>
White	<input type="checkbox"/>	Other	<input type="checkbox"/>		<input type="checkbox"/>		<input type="checkbox"/>

4. Level of education:

Tertiary	<input type="checkbox"/>	High school	<input type="checkbox"/>	Primary school	<input type="checkbox"/>	Never went to school	<input type="checkbox"/>
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5. Employment type:

Full-time	<input type="checkbox"/>	Part-time	<input type="checkbox"/>	Self-employed	<input type="checkbox"/>	Unemployed	<input type="checkbox"/>
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**Section B: Checkbox/choice questions:** Please tick the option that applies to you (You may tick more than one option):

1. Where/how do you acquire /get the tyres?

Factory	<input type="checkbox"/>	Tyre Stores (Tyremart, Hi Q etc.)	<input type="checkbox"/>	Used tyres suppliers	<input type="checkbox"/>
Resellers	<input type="checkbox"/>	Import	<input type="checkbox"/>	Other (Specify)	<input type="checkbox"/>

2. Who do you sell the tyres to?

Motor vehicle driver	<input type="checkbox"/>	Taxi driver	<input type="checkbox"/>	Truck driver	<input type="checkbox"/>
Resellers	<input type="checkbox"/>	Export	<input type="checkbox"/>	Other (Specify)	<input type="checkbox"/>

3. How much do you sell the tyres for (per tyre)?

R0 - R300	<input type="checkbox"/>	R300 – R600	<input type="checkbox"/>	R600 - R900	<input type="checkbox"/>
R900 - R1200	<input type="checkbox"/>	R1200 - R1500	<input type="checkbox"/>	> R1500	<input type="checkbox"/>

4. How many years have you been operating as a waste tyre dealer?

0 - 5	<input type="checkbox"/>	6 – 10	<input type="checkbox"/>	11 - 15	<input type="checkbox"/>
16 - 20	<input type="checkbox"/>	>20	<input type="checkbox"/>		<input type="checkbox"/>

5. How many employees are employed in the business?

0 - 5	<input type="checkbox"/>	6 – 10	<input type="checkbox"/>	11 - 15	<input type="checkbox"/>
16 - 20	<input type="checkbox"/>	>20	<input type="checkbox"/>		<input type="checkbox"/>

6. Where do you store the tyres?

On site	<input type="checkbox"/>	At home	<input type="checkbox"/>	Warehouse	<input type="checkbox"/>
Open space	<input type="checkbox"/>	Other (Specify)	<input type="checkbox"/>		<input type="checkbox"/>

7. If there are any tyres that you cannot sell, where do you dispose of the tyres?

Waste bins/skips	<input type="checkbox"/>	Illegal dumping	<input type="checkbox"/>	Landfill	<input type="checkbox"/>
Store onsite	<input type="checkbox"/>	Other (Specify)	<input type="checkbox"/>		<input type="checkbox"/>

4. I believe that the informal waste tyre sector makes a positive socio-economic contribution to communities.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

5. I believe that informal waste tyre dealers should be integrated into the formal waste tyre sector in South Africa.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

6. I believe that integration of informal waste tyre dealers could be advantageous to the formal waste tyre sector.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

6. I believe that the operation of my waste tyre dealership is legal.

1-Strongly agree	2-Agree	3-Neutral	4-Disagree	5-Strongly disagree

7. I do not feel threatened running my waste tyre dealership.

1-Strongly agree	2-Agree	3-Neutral	4-Disagree	5-Strongly disagree

8. How much money do you make from this business monthly? (average)

R0 – R3000		R3000 – R6000		R6000 – R9000	
R9000 - R12000		R12000 - R15000		> R15000	

9. Do you have a fire management plan for your tyre depot?

Yes		No		I am not sure	
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10. Do you test the quality of the tyres before selling them?

Yes		No		I am not sure	
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**Section C: Likert statements:** Please indicate your level of agreement (1) or disagreement (5) with the following statements:

1. Informal waste tyre management/dealers present challenges in South Africa.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

2. I believe that the informal waste tyre sector makes a positive contribution to the sound management of tyres in South Africa.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

3. I believe that the informal waste tyre sector makes a positive contribution to the livelihoods of informal waste dealers in South Africa.

1. Strongly agree	2. Agree	3. Neutral	4. Disagree	5. Strongly disagree

**Section D: Open-ended questions**

1. In your opinion, should informal waste tyre dealers be integrated into the formal waste management sector in South Africa? (please motivate your answer)

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2. What assistance would you require from the formal waste sector, if you were to be integrated?

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