



**ENVIRONMENTAL KNOWLEDGE, ATTITUDES AND PERCEPTIONS OF PORT
OF CAPE TOWN USERS AS IT PERTAINS TO WASTE AND POLLUTION
MANAGEMENT**

by

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DECLARATION

I, Aupaki Michael Melato, declare that the contents of this dissertation/thesis represent my own unaided work, and that the dissertation/thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.



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ABSTRACT

According to the Environmental Management Department (EMD) of the Transnet National Ports Authority, South African ports are faced with numerous environmental challenges in their operations. The Port of Cape Town is not excluded from these challenges. Due to various activities conducted within the port premises and in surrounding areas, waste generation and pollution are of great concern. Environmental pollution in the Port of Cape Town is an ongoing problem that has serious implications for port operations, for the future of the port, and the surrounding environment. Without understanding the port users' awareness, training, knowledge, attitude, perception and practices, it is likely that certain current unsustainable practices will continue, despite standards, strategies and legislation that are in place. In gaining an understanding of human behaviour towards the environment, the research findings can contribute to the development of a strategy that will address the current situation and assist in formulating the best environmental management practices in the Port of Cape Town. The objectives of the study were: to determine the awareness, training, knowledge, attitudes, perceptions and practices of port users regarding waste and pollution management; to identify the potential barriers and opportunities for the port as they pertain to waste and pollution management; to assess and evaluate the roles of relevant stakeholders (local government) other than port users in waste and pollution management in the port. The data of the study were collected using self-administered questionnaires, which were distributed to 165 managerial and 636 non-managerial employees of the TNPA, as well as purposively sampled tenants, contractors and waste licenced permit holders that are users of the Port of Cape Town. Interviews with relevant government departments were conducted. For the purpose of this explorative descriptive study, the statistical analysis was done by using the SPSS statistical package. The port users are generally aware of the port environmental conditions with a view that littering and port clean-ups were important issues that came to mind regarding waste and pollution. They were also aware of the illegal dumping taking place in the Port of Cape Town, which has a potential negative environmental impact. It therefore seems as if Transnet, as landlord, does not have a clear management strategy to address littering and the awareness of its impact in the port. There is notable awareness in terms of recycling at the workplace and the financial benefits thereof. The local government officials felt that collaboration on

awareness programmes is not sufficient. Surprisingly, TNPA ranked quite low compared to the other target groups in terms of environmental training programmes. A contributing factor seemed to be the TNPA financial moratorium. For the most part, it was found that appropriate labelling of waste reception facilities for the type of waste promote waste segregation and correct disposal of waste. However, instances were found where labelling of waste reception facilities did not take place. Consequently, waste was not segregated and properly disposed of. In general, the respondents were positive across all target groups in their perception of the future of the port environment, compared to their past and present perceptions. They have shown a positive and optimistic future outlook in terms of the port environment. The majority of the ME's and NME's showed a positive attitude in terms of taking environmental incidents seriously and it being addressed. However, a contradiction was observed between ME's and NME's in relation to feedback on reported environmental incidents. This may be due to several avenues of reporting that is used in the port. Furthermore, the study suggests that pollution is managed differently in different parts of the Port of Cape Town, better in some parts than others. Although respondents generally perceive that fines are enforced to manage pollution issues, many still agree that pollution management is a problem at the port. As the landlord, the Ports Authority is not empowered to issue environmental fines, and there are also unpromulgated environmental legislations related to ports. Despite these, port users showed relatively high levels of caution in terms of environmental care in their operational activities in the port. Most of the respondents indicated that they apply waste and pollution knowledge that they have learnt at work, at their homes as well. The lessons learnt from work, which were practiced by the employees at home, were, for example, waste segregation, recycling and good housekeeping. These kinds of practices can be linked to increased awareness, training, knowledge, positive attitudes and perception. Investing in continuous learning, professional development and environmental legislation is therefore important, not only for the employees' growth but also for achieving broader objectives related to organisational success and the United Nations Sustainable Development Goals. Although the focus of the investigation was limited to the Port of Cape Town, the lessons learnt can be constructively applied to other South African ports.

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DEDICATION

To all the Melato family, and relatives.

Almighty God. Glory and honour unto you, forever.

AMEN

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GLOSSARY

Terms/Acronyms/Abbreviations	Definition/Explanation
CCT	City of Cape Town
CCTC	City of Cape Town Council
COP	Contracting of Parties
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs & Development Planning
EIA	Environmental Impact Assessment
EMD	Environmental Management Department
HPA	Hedonic Price Analysis
IEM	Integrated Environmental Management
I&AP	Interested and Affected Parties
LGMSA	Local Government Municipal Systems Act
MSA	Municipality Systems Act
ME	Managerial Employees
NME	Non-Managerial Employees
NEMA	National Environmental Management
PCT	Port of Cape Town
SHE	Safety Health and Environment
TIMA/S	Transnet Integrated Management Approach/System
TNPA	Transnet National Ports Authority
UNEP	United Nations Environmental Programme

Abidjan Convention The convention for the Co-operation in the protection, management and development of the Marine and Coastal Environment of the Atlantic Coast of the West, Central and Southern Africa Region (Also known as the Abidjan Convention). The Action Plan and the Abidjan Convention were adopted by the Governments in 1981; the Convention entered into force in 1981 (UNEP, 2011).

Attitudes Mental representations of various features of the social or physical world. They are acquired through experience and exert a directive influence on subsequent behaviour (Baron & Byrne, 1991).

Attitudes Accessibility The ease with which specific attitudes can be remembered and brought into consciousness (Baron & Byrne, 1991).

Classical Conditioning A basic form of learning in which one stimulus, initially neutral, acquires the capacity to evoke reactions through repeated pairing with another stimulus. In a sense, one stimulus becomes a signal for the presentation or occurrence of the other (Baron & Byrne, 1991).

<i>Environmental Impact Assessment</i>	Is the process of evaluating the likely environmental impacts of a proposed project or development, taking into account interrelated socio- economic, cultural, and human health impacts, both beneficial and adverse (Cloete, 2008).
<i>Environmental Education</i>	Is a process that allows individuals to explore environmental issues, engage in problem solving, and take action to improve the environment. As a result, individuals develop a deep understanding of environmental issues and have the skills to make informed and responsible decisions (Park <i>et al.</i> , 2008).
<i>Environmental Legislation</i>	Combined body of rules and regulations, instructions and laws, limitations and allowances that are all aimed at the maintenance and protection of the natural environment of a country (Okafor, 2011).
<i>Illegal Waste Dumping</i>	Illegal waste dumping is a discarding waste in an improper or illegal manner, where it does not belong and/or where environment damage is likely because of the improper disposal (UNEP, 2012).
<i>Instrumental Conditioning</i>	A basic form of learning in which response that lead to positive outcomes or that permit avoidance of negative outcomes are strengthened (Baron & Byrne, 1991).
<i>Managerial Employee (ME)</i>	Managerial permanent employee, fixed term, contract employee, temporary employee, contracted service provider of Transnet Ltd SOC (Transnet, 2014a).
<i>Modeling</i>	A basic form of learning in which people acquire new forms of behavior through observing others (Baron & Byrne, 1991).
<i>Non-Managerial Employee (NME)</i>	Permanent employee, fixed term, contract employee, temporary employee, contracted service provider of Transnet Ltd SOC (Transnet, 2014a).
<i>Non-Participant Observation</i>	Observation studies, in which the researcher's role is to record what is seen and heard without otherwise taking part in any activities (Polgar & Thomas, 1991).
<i>Pollution</i>	The degradation of the natural systems by the addition of harmful substances (Chenje & Johnson, 1996).
<i>Port Users</i>	Any person other than the cruise terminal operator, organisation and or agency utilising the facilities of the port and conducting business within the port limits, including shipping lines, vessels agents, licensed operators, tenants, merchant leaseholders, any third parties authorised to conduct a business on behalf of others and the public, entering the port (Stahl, 2013).

<i>Purposive sampling</i>	Cases for study (e.g., people, organizations, communities, cultures, events, critical incidences) are selected because they are “information rich” and illuminative, that is, they offer then, is aimed at insight about the phenomenon, not empirical generalization from a sample to a population (Patton, 2002).
<i>Stakeholder</i>	Stakeholder means a person or group of persons who are directly or indirectly affected by Transnet, including those who may have interests in Transnet’s business activities and/or the ability to influence Transnet’s business outcomes, either positively or negatively (Transnet, 2014b).
<i>Waste</i>	Any unavoidable material resulting from domestic activity or industrial operation for which there is no economic demand, and which must be disposed of. Also, waste refers to liquid or solid discharged from residences, business premises, small scale industries and institutions (Okonkwo <i>et al.</i> , 2009).
<i>Waste management</i>	Is the collection, transport, processing, or disposal, managing and monitoring of waste materials. The term usually relates to materials produced by human activity, and the process is undertaken to reduce their effect on health, the environment or aesthetics (Lemann, 2004).
<i>Hedonic Price Analysis</i>	Are the implicit price of attributes, which are revealed to economic agents from observed prices of differentiated products and the specific characteristics associated with them (del Saz-Salazar <i>et al.</i> , 2013).
<i>Competent Person</i>	In relation to construction work, means any person having the knowledge, training and experience specific to the work or task being performed: Provided that where appropriate qualifications and training are registered in terms of the provisions of the South African Qualification Authority Act, 1995 (Act No. 58 of 1995), these qualifications and training shall be deemed to be required qualifications and training (Republic of South Africa, 2014).

PUBLICATIONS

Publication

- (a) Aupaki Michael Melato, Corrie Uys, De Wet Schutte, James Odendaal. The Perception of Port Users Regarding Pollution Management at a Port in the Western Cape, South Africa. Polish Journal of Environmental Studies. Vol. 34, No. 6 (2025), 8157- 8175. DOI: 10.15244/pjoes/195351

Manuscripts in preparation

- (a) Status of environmental training for contractors and tenant's managerial and non-managerial employees in Cape Town seaport, South Africa.
- (b) Application and environmental training programmes for Transnet and WLPH's employees at a seaport in the Western Cape, South Africa.

Chapter 1

INTRODUCTION & LITERATURE REVIEW

1.1 HISTORICAL BACKGROUND OF WASTE AND POLLUTION

Over the last three decades there has been increasing global concern over the public health impacts attributed to environmental pollution (UNEP, 2012). In the fourteenth century the Old French word “polluere”, meaning pollution, emerged and originated from the Latin word that means “to soil or defile” (Barnhart, 1995).

Reference to different types of environmental pollution were absent from politics and legislation in the 1800's. None of the earliest judicial decisions that mentioned pollution involved harm to the natural environment (Nagel, 2009). The American judiciary in their decisions in the nineteenth century mentioned several types of pollution, including numerous mentions to environmental pollution. As a federal court counseled in 1886, “The right to pure air is incident to the land - as much so as the right to the uninterrupted flow of a stream of pure water which runs through it - and no one can be permitted to pollute either, to the injury and disadvantage of the owner” (Delaware, 1886).

For the first time in South Africa, a few years ago, a director was faced with imprisonment for environmental negligence in a clay mining company. Though some Directors have been charged and some have been found guilty and paid fines in their personal capacities, for many years the power to imprison a director has not ever been implemented (Winstanley, 2014). Regulatory pressure has forced managers to consider environmental factors within their strategic planning process (Stone & Wakefield, 2000).

Environmental matters are being realised and popularized. Recently, conferences also made an impact in both scientific and political agendas (e.g. 1992 Earth Summit in Rio de Janeiro, Brazil). De Haven (1988) stated that people are concerned about environmental problems at a local level, not *per se* at the global scale. Furthermore, Catton and Dunlap (1978) indicated that people perceive the environment in terms of what is direct to them and at local level. The people's anxiety is linked with their personal interest and knowledge (De Haven, 1988). Pollution operates in society at

different levels, one mainly instrumental and the other expressive. Generally, people try to influence the behaviour of the other. This is whereby social pressures are being reinforced by systems of belief (Douglas, 1966). The second level is dangers that threaten pollution offenders in society (Douglas, 1966).

It has been found that human activities contribute the most to marine pollution, in a sense that these activities caused a massive decline in the world's biological diversity (Derraik, 2002). If solid waste is not handled appropriately, it has the potential to become marine litter. Marine litter results in environmental, economic, health and aesthetic problems. There are actions, laws, regulations and policies that intend to help minimize the widespread nature of marine litter. Litter that is found in huge quantities, eventually pollute the environment with various chemical contaminants (UNEP, 2013; UNEP, 2009).

One of the most prevalent causes of environmental pollution and degradation in many cities is solid waste. This is due to improper management of waste, particularly in highly urbanized cities in developing countries. Proper waste disposal facilities and solid waste regulations are often lacking in these cities. Such waste may be infectious, toxic, or radioactive (UNEP, 2012). UNEP (United Nations Environmental Programme) defines waste as "substances or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law". Waste also refers to "an item, material or substance you as an individual consider useless at a given time and place" (Pongràcz, 2009).

1.2 SIGNIFICANCE OF PORTS AND THEIR IMPACT ON THE ENVIRONMENT

There are enormous amounts of waste generated in developing countries, although they have governmental institutions and bureaucracies that are managing waste. Most of the developing countries are in transitional stages for better management of waste (CSIR, 2011; Rajput *et al.*, 2009). As a developing country (UNCTAD, 2009), South Africa is rapidly increasing in population and growth of its economy, rising standard of living and the development of technology (Bosman, 2009; Mishra, 2003; Dickerson, 1999). The more the population increases, and the economy gains strength, the heavier are the environmental burden (Mathe, 2014). This development brings along

numerous challenges, among others, increased volumes of waste generated. The increased amount of waste can be attributed to urbanisation and industrialisation, as well as more pressure on waste management infrastructure. A further complicating matter is decreasing capital investment and poor maintenance (DEA, 2011).

The sources of generated waste are through several sectors. For instance, some of these sectors include industrial, medical (clinical), agricultural and municipal. The waste generated in these sectors came from hospitals, clinics, horticultural activities such as (fruit and vegetable growing), households, construction activities, industries, as well as ports, that import and export commodities and products (ABP Research, 1999).

In terms of international trading and movement, the most important components are shipping and ports. Approximately 80 to 90% of the world's trade in terms of carriage and handling is via the international shipping and port industry (UNCTAD, 2009; World Bank, 2003). Since the early 1970's up to now, there has been an incredible rise of seaborne trade. The world seaborne trade in 1970 amounted to 2.6 million tons, in 1980 to 3.7 billion tons, in 1990 to 4 billion tons, and in 2009 it exceeded 8 billion tons (UNCTAD, 2009). The increasing seaborne trade results in more seafaring vessels and increased risk of collisions, increased accidental and operational oil spills, as well as rising air pollution and environmental threats (Naidoo, 2015).

There are many pathways that waste can enter in the port environment. Waste can find its way via overboard dumping from ships and boats and via waste which is generated within the port's operational areas (Galgani *et al.*, 2013). Other ways which waste can gain its entry into the port environment are through streams, rivers and neighbouring storm water systems (ABP Research, 1999; EMD, 2014). Through these various entry points the port environment, and the associated natural environment can be threatened by waste (Ng & Song, 2010). Port marine litter has become more and more abundant and also poses significant environmental and human health concerns. Furthermore, many waste items such as plastic are buoyant and can be carried long distances with currents. Globally, each year more than one million birds and 100 000 marine mammals and sea turtles become entangled or die after getting into contact with plastics material dumped in the sea (UNEP, 2006).

Most of the ports are historically placed close to towns and cities. Many environmental accidents frequently happen nearby urban areas. Any incidents with environmental concerns can impact or affect nearby populations to varying degrees depending on the scale of the incident (Darbra *et al.*, 2004). Previously the ports have mostly been concerned about their own operations and economic efficiency, rather than being considerate of the surrounding environment impacted by its activities (Wooldridge & Stojanovic, 2004). In line with this, economic demands, and major changes in technology in the shipping industry has served as a catalyst to allow for port expansions to accommodate the increase of cargo volumes.

Sea ports are extraordinarily complex systems from an environmental point of view, in fact, the very presence of ports, as well as any possible expansion of its infrastructure and operations results in a loss of habitat (Darbra *et al.*, 2004). The current globalisation process in the maritime transport industry has gained technological breakthroughs in increasing containerization and other key changes in cargo handling facilities which takes place in port environment (Olivier and Slack, 2006).

These changes in port activities have negative effects on the receiving natural environment. This can be referred to as negative and positive environmental externalities. The negative externalities have a negative impact on the environment, while positive externalities generally result in increase of the quality of the environment. Land reclamation, noise, air and water pollution, odours and visual impact are amongst the core environmental effects resulting from port expansion (Saz-Salazar, 2012). Hence, due to port expansion in cities, many people are becoming aware and concerned about the associated negative environmental impacts (Morris & Gibson, 2007).

The Port of Cape Town is one of the ports in Southern Africa where plans are in place to expand the port due to economic demand. The plans are to integrate the port, the city and the V&A waterfront, especially with the passenger terminal within the port and the development in the surrounding areas (TNPA, 2014a, Transnet Annual Report, 2016). These external costs included costs linked to air pollution, accidents, congestion, noise, and any other related external costs (del Saz-Salazar *et al.*, 2013).

In the study by Wiegmans and Louw (2011) it appears that in the Port of Amsterdam, but also in other ports, the expansion pace of the port area is slowing down, whereas at the same time the city is growing in the direction of the port at a fast pace. In spite of the growing opposition to expanding ports, the Port of Valencia, which is one of the leading ports in the Western Mediterranean and the fifth largest port in Europe, in terms of containerized cargo, still expanded so that it can accommodate the anticipated traffic increase in the future (ESPO, 2012).

In view of this expansion from an environmental impact perspective, the construction of new quays affected the coastal hydrography, triggering erosion at the nearby coastal areas due to reduced sediment availability. When there is a structure from the land protruding into the sea (like a man-made port) it may alter the depositional-hydrodynamic regime as an effect of changing littoral currents. As a result, coastal erosion takes place. This was one of the main environmental problems (Frihy, 2001). It is very important to take these externalities into consideration into decision-making on port expansion and transformation of port areas (de Saz-Salazar *et al.*, 2013).

According to Gao (2008) local environments are affected in the course of port construction, operation and development. There are several ways that the port may affect the environment. These include:

Firstly, major negative effects on the terrestrial and marine environments, in terms of land and coastal resources and fisheries.

Secondly, the development of industries near to ports may possibly lead to permanent long-term impacts on land, the coastline and other natural resources.

Thirdly, chemicals and oil spills and other environmental accidents can have serious negative impacts on the terrestrial and marine environments and fisheries resources.

Fourthly, as numerous cargos are transported through the port, they can become possible sources of pollution. Pollution of the port environment may happen during loading, transportation, and storage of cargo such as coal and chemical products. The port may suffer from enormous amounts of particles released into the air. Machinery and vehicles generate considerable noise, instigating daily disturbance and difficulties for people living near the port area. Ships that are loading and offloading cargo at the

port also carry ballast water and waste that cause serious environmental problems on a local scale through inappropriate disposal.

Then in all these the question becomes how to decrease the negative impact of the ports on its associated environment. The answer to this is that each and every port industry in their progression of port expansion or development may possibly be able to address this question. Based on the assessment in Nigeria, US and UK, it was found that dealing with port environmental problems normally focus on three main aspects: (i) port environmental protection measures, (ii) port environmental management, and (iii) port policy (Casal *et al.*, 1999; Eco-information, 1999; Darbar *et al.*, 2004). Gao (2008) stipulates that the coordination of the relationship between environmental protection and port development is one of the significant tasks of sustainable social and economic development for every country in the world.

1.3 TRANSNET AND THE PORT OF CAPE TOWN

Transnet Ltd was established in 1990 and its only South Africans shareholder is the South African government, which controls the main transport infrastructure of the country (Mayer & Onyango, 2005). Transnet delivers thousands of tons of goods around the country on daily basis, through amongst others, its seaports. The vision of the company is focused on freight import, export and transport. It delivers integrated, efficient, safe, reliable and cost-effective services to support economic growth of the country (Transnet National Ports Authority, 2013).

According to van Zyl (2005) and Transnet National Ports Authority (2013), Transnet SOC Ltd have five operating divisions (figure 1.1). These divisions are as follows: -

- Transnet freight rail (formerly Spoornet – the freight rail division);
- Transnet rail engineering (formerly Transwerk - the rolling stock maintenance business);
- Transnet port terminals (formerly SAPO - managing port and cargo terminal operations in the nation's leading ports);
- Transnet pipelines (formerly Petronet - the fuel and gas pipeline business, pumps and manages the storage of petroleum and gas products through its network of high-pressure, long-distance pipelines);

- Transnet national ports authority (formerly the NPA - fulfils the landlord function for South Africa's port system).

The Transnet National Ports Authority (TNPA) is responsible for the safe, effective and efficient economic running of the national port system. It provides port infrastructure and marine services at the eight commercial seaports in South Africa - Durban, East London, Mossel Bay, Ngqura, Port Elizabeth, Richards Bay, Saldanha and Cape Town. The TNPA functions within a legislative and regulatory environment, created by the National Ports Act of 2005 (Act No. 12 of 2005) (Republic of South Africa, 2005).

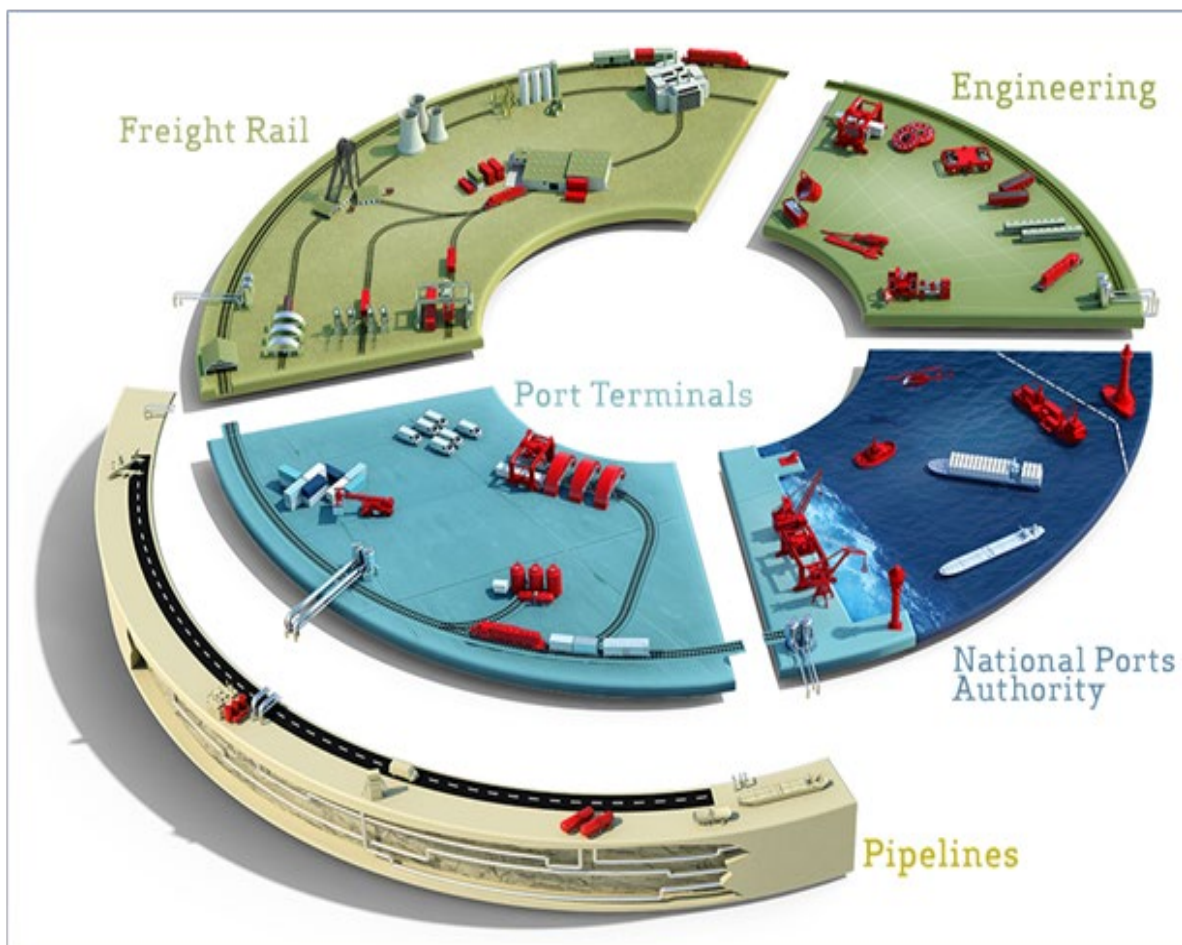


Figure 1.1: Transnet SOC Ltd five operating divisions' business model. (Source: Transnet Ltd SOC, 2016).

1.4 LEGISLATION

1.4.1 Legislation and policies governing the South African port environment

Prevention and control of pollution is one of most important targets of environmental law. In the United States of America, hundreds of federal and state statutes, administrative regulations, and international treaties have established multiple approaches to address air, water and land pollution. Yet the law still struggles to identify exactly what comprises pollution, to determine how much of it is tolerable and what we should do about it (Nagel, 2009). As time went on, however, society has become more concerned about environmental issues (García-López *et al.*, 2012).

In most countries legislation have been passed to promote port environmental protection within ports. The concept of environmental protection is being integrated into day-to-day activities (Lloyd *et al.*, 1999). In the past, the environmental performance of industries was not really measured or evaluated. There is more pressure on businesses with respect to the environment in which their activities are developed and operates (García-López *et al.*, 2012).

Environmental legislation is established to mitigate or avoid the persistent environmental difficulties which arise from human activities in the pursuit for economic development and growth (Okafor, 2011). According to Kadafa (2012) these legislations are outlined to control observed and perceived environmental challenges. Due to the diverse groups of participation in human activities some stakeholders benefit while others suffer the negative consequences due to environmental degradation. Several laws are being enacted to stop contamination of the environment, but little is achieved, and the problem persists (Ophori, 2006).

In terms of Schedule 5B, Section 24, of the Constitution of South Africa (Act 108 of 1996), waste management is a local government responsibility that must be performed to protect human and environmental health (Republic of South Africa, 1996a). The Local Government Municipal Systems Act (Act No. 32 of 2000) outlines the legal commitment of the local government (Republic of South Africa, 2000). The management of waste through various processes should ensure a safe, healthy and sustainable environment. This will make sure that the rights of individuals are protected. The right requires that all stakeholders must accept co-responsibility for

minimising waste impacts on the environment. The City of Cape Town waste policy encourages a change of behaviour, promotion of campaigns, awareness and training to its community (CCT, 2002).

The Department of Environmental Affairs and Development Planning (DEA&DP) took initiative of strengthening the legislation with regards to waste management in the municipalities of the Western Cape by developing the provincial integrated waste management plan as required by NEMWA (National Environmental Management Waste Act (No. 59 of 2008) (DEA&DP, 2011).

1.4.2 South African Constitution (Act No.108 of 1996)

Several rights contained in the Bill of Rights are potentially relevant to the prevention and control of marine pollution. The Bill of Rights, chapter 2 of the constitution raises several fundamental rights which are pertinent to pollution control generally: The environmental right (section 24) of the constitution (No. 108 of 1996a) provides that: everyone has the right –

- a. to an environment that is not harmful to their health or well-being; and
- b. to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that- (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.

1.4.3 National Environmental Management Act (Act No. 107 of 1998)

Section 24 (b) of the National Environmental Management Act (NEMA) gives effect to the South African Constitution, which states that all South African citizens have a right to an environment that is not harmful to their health or well-being (Republic of South Africa, 1996a; Republic of South Africa, 1998a). Chapters 2 and 5 of NEMA provides “a basis for consideration of potential impacts associated with a proposed development by the competent authority.” These chapters provide the framework for detailed environmental impact assessment (EIA) regulations.

Section 28 of the Act is specific regarding “duty of care for the environment and remediation of environmental damage. Accordingly, every person who causes has

caused or may cause significant pollution or degradation of the environment must take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring. The Act defines pollution broadly, as any change in the environment caused by substances, radioactive, or other waves, or emissions of noise, odours, dust or heat.” This section would further be relevant to the construction and operation phase of a proposed development. The proponent is obligated, in terms of NEMA, to implement measures and take actions to prevent any form of pollution to air, water or land (Republic of South Africa, 1998a).

“The environmental authorities may direct an individual or organisation to rectify or remedy a potential or actual pollution problem.” If such a directive is not complied with, the authorities may undertake the work and recover the costs from the responsible party (Kakongea, 1998; Republic of South Africa, 1998a).

1.4.4 National Environmental Management: Waste Act (Act No. 59 of 2008)

On the 1st of July 2009, the National Environmental Management: Waste Act, 59 of 2008 (NEM: WA) commenced in South Africa (Republic of South Africa, 2008a). According to Naidoo (2015), this piece of legislation in waste management replaced what was dealt with under the Environmental Conservation Act (ECA) and now is the overarching legislation for waste management. The sections that are applicable to Transnet National Ports Authority, port users and tenants are detailed in the following subsections.

Transnet National Ports Authority as holders of waste are required by Section 16 to take all reasonable measures to-

- a. avoid the generation of waste and where such generation cannot be avoided, to minimize the toxicity and amounts of waste that are generated.
- b. reduce, re-use, recycle and recover waste.
- c. where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner.
- d. manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts.

- e. prevent any employee or any person under his or her supervision from contravening this Act; and
 - f. prevent the waste from being used for an unauthorized purpose
- (Republic of South Africa, 2005; Republic of South Africa, 2008a).

1.4.5 National Ports Act (Act No. 12 of 2005)

In line with the provisions of the National Ports Act, the core functions of the Transnet National Ports Authority (TNPA) are as follows: “To plan, provide, maintain and improve port infrastructure; To provide or arrange marine-related services; To ensure the provision of port services, including the management of port activities and the port regulatory function at all South African ports; and is to provide aids to navigation and assistance to the manoeuvring of vessels within port limits and along the coast.”

The main function of the TNPA is to own, manage, control and administer ports to ensure their efficient and economic functioning, and in doing so the authority must, (i) maintain the sustainability of the ports and their surroundings; (ii) manage pollution and the protection of the environment within the port limits (Republic of South Africa, 2005).

1.4.6 National Water Act (Act No. 36 of 1998)

This National Water Act (No. 36 of 1998) (NWA) deals, amongst others, with the protection of South Africa’s water resources. In the context of the Act waste is solid material or material that is suspended, dissolved or transported in water (including sediment) and which is spilled or deposited on land or into a water resource in such volume, composition or manner as to cause, or to be reasonably likely to cause, the water resource to be polluted (Republic of South Africa, 1998b).

Alongside related lines to the National Environmental Management Act (Act No. 107 of 1998), Section 19(1) of the NWA contains a pollution prevention requirement placing a pollution prevention duty on landowners, persons in control, users or occupiers of land to take all reasonable measures to prevent water pollution from occurring, continuing or recurring (Republic of South Africa, 1998a; Republic South Africa, 1998b). The TNPA are landowners of the ports in South Africa (Transnet National Ports Authority, 2013). The National Ports Act of 2005 (Act No. 12 of 2005) stipulates

that “the duty to ensure the protection of the port’s marine environment lies with the TNPA.”

There are some water uses relating to waste in Section 21 of the NWA that require registration and / or licensing. These include -

- Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or another conduit; and
- Disposing of waste in a manner which may detrimentally impact on a water resource.

Section 20 of the NWA deals with the management of emergency incidents. There are a few legal requirements pertaining to reporting (immediate and post incident investigation) and clean up and investigation requirements. It is essential that waste management is addressed on emergency management plans.

1.4.7. Integrated Coastal Management Act (Act No. 24 of 2008)

The Integrated Coastal Management Act (ICM) was promulgated in South Africa, February 2009, which is a committed, area-specific legislation aimed precisely at dealing with the complex coastal and marine environments, as well as addressing previous prejudices by placing rights of South Africa’s coast with its populations and promoting sustainable entrance to the coast and the free ecosystem goods and services it offers (Celliers *et al.*, 2009).

The ICM Act (Act No. 24 of 2008) is a Specific Environmental Management specific environmental related Act under the umbrella of the NEMA and helps integrated coastal management as a managing philosophy. This Act as well provides effect to South Africa’s onuses on the prevention of marine pollution by the dumping of wastes and other matter at sea in terms of the provisions of the London Convention and London Protocol (Republic of South Africa, 2008b; DEA, 2014b).

Other key legislation governing the management of marine and coastal environments in the country are the Marine Living Resources Act (MLRA) and the NEMA (Republic of South Africa, 1998c).

1.5 REGULATIONS AND STANDARDS

There has been numerous regulations and standards that have been published in terms of NEM: WA (Act No. 58 of 2008). The regulations listed below are pertinent to the TNPA as they form part of the framework in waste management (Naidoo, 2015).

1.5.1 National Waste Information Regulation

On 1 January 2013, these regulations were affected and require certain categories of persons to record on the South African Waste Information System (SAWIS) developed by the Department of Environmental Affairs (DEA) in 2005. Both the government and the industries use this system to capture routine data on the generated waste tonnages, recycled, disposed of in South Africa for every month and on yearly basis (DEA, 2012).

1.5.2 Waste Classification and Management Regulation

In terms of Section 69 of the NEM: WA Waste Act, 2008 (the Act) serves to regulate the classification and management of waste in a manner which supports and implement the provisions of the Act. The regulations will allow the improved and more effective classification and management of waste, deliver for safe and appropriate handling, storage, recovery, reuse, recycling, treatment and disposal of waste. Furthermore, it also enables accurate, relevant reporting on waste generation and management (Republic of South Africa, 2008a).

1.5.3 Compliance and Enforcement

In terms of Chapter 7 of the NEMA, compliance and enforcement is dealt with by National Environmental Management Inspectors appointed in relation to NEMA. Persons are required to submit waste impact reports. If there are reasonable grounds to suspect that such person has on one or more occasions contravened or failed to comply with this Act, or any conditions of a waste management licence or exemption and that the contravention or failure has had or is likely to have a detrimental effect on health or the environment, including social conditions, economic conditions, ecological conditions or cultural heritage, or has contributed to the degradation of the environment, the Act provides for a substantial number of offenses for failure to comply with the specified requirements for treatment and disposal of waste, licensing to

undertake waste related activities and disposal at authorised sites (Republic of South Africa, 1998a).

1.6 CONVENTIONS

1.6.1 MARPOL Convention

South Africa is a signatory to the International Convention for the Prevention of Pollution from Ships of 1973, as amended by the Protocol of 1978 called MARPOL73/78. The MARPOL Convention is the globally recognised international convention covering prevention of pollution of the marine environment by ships from operational or accidental causes. It is a combination of two accords approved in 1973 and 1978 respectively and updated by revisions through the years (Marpol, 1973). The Convention comprises regulations aimed at preventing and minimizing pollution from ships - both accidental pollution and that from monotonous operations and presently embraces six technical annexes (Table 1.1).

Under the requirements of the Convention, the international community of maritime states is assigned to set in place procedures to ensure that ships do not involve in unacceptable practices of discharging their waste and cargo residues at sea. MARPOL 73/78 advocates that there must be a properly planned, easy-to-use and cost-effective system to manage incoming waste streams at the reception facilities of all operational ports (Marpol, 1973).

The requirements of the MARPOL Convention are addressed through numerous pieces of South African legislation, including (but not limited to) Marine Pollution (Prevention of Pollution from Ships) Act 2 of 1986, and the Reception Facilities for Garbage from Ships Regulations (GNR 1491, 1992). In order to fulfil its obligations under the Convention, South Africa has delegated the responsibility by means of the National Ports Act and the Port Rules, to provide adequate ship generated Waste Reception Facilities to harbours, ports and terminals without causing any undue delay to ships (Republic of South Africa, 2005).

Table 1.1: MARPOL waste annexures	
International Convention for the Prevention of Pollution from Ships	
Annex I	Regulations for the Prevention of Pollution by Oil
Annex II	Regulations for the Control of Pollution by Noxious Liquid Substances in Bulk
Annex III	Prevention of Pollution by Harmful Substances Carried by Sea in Packaged Form
Annex IV	Prevention of Pollution by Sewage from Ships
Annex V	Prevention of Pollution by Garbage from Ships
Annex VI	Prevention of Air Pollution from Ships

1.6.2 The Basel Convention

The Basel Convention is a worldwide agreement which seeks to address the trans-boundary movement of hazardous waste. The Convention is positioned on the reduction of the production of hazardous waste and control of trans-boundary movement and disposal of such waste. It also aims at ensuring that strict controls are in place when trans-boundary movement and disposal of hazardous waste do happen, and to make sure that it is carried out in an environmentally reasonable and responsible way (UNEP, 1989).

The Basil Convention, held on 22 March 1989, came into effect during May 1992 after endorsement by the prerequisite number of countries. South Africa endorsed the Convention in 1994, with Department of Environmental Affairs being the driver for the Convention. Although South Africa then agreed to this Convention, no legislation was approved at the time to give effect influence on it. The second Basel Convention held on 08th October 2005, set the standards for the control of trans-boundary movements

of hazardous waste and their disposal between member countries. South Africa agreed to this Convention and implements its provisions (UNEP, 1989; Naidoo, 2015).

The key objectives of the Basel Convention are: -

- To minimize the generation of hazardous wastes in terms of quantity and hazardousness.
- To dispose of hazardous waste as close to the source of generation as possible.
- To reduce the movement of hazardous waste; and
- Locally, draft regulations are being prepared in an effort to control the movement of such waste.

1.6.3 The London Convention

The London Convention (1972) on the prevention of marine pollution by dumping of waste and other matter aims at preventing marine pollution by preventing dumping of waste such as sewage sludge, dredged material, industrial waste and radioactive waste at sea, as well as incineration at sea. South Africa is a signatory to this Convention and the associated 1996 Protocol.

This Convention and its various protocols were incorporated into the following South African legislations:

- Prevention of Pollution from Ships Act (Act 2 of 1986), and the Prevention of Pollution by Garbage from Ships Regulation (GN R140, published in Government Gazette No. 14000, dated 29 May 1992).
- The Dumping at Sea Control Act (Act 73 of 1980) (DEA, 2014b).

1.7 Transnet Risk Management and Framework

Transnet risk management strategy and framework, SHE policy as the adopted key element of the strategy for pollution prevention of oil spill occurrences within the operational areas and port surroundings were created in response to Section 16. The business of Transnet will ensure that the waste management hierarchy (Figure 1.2) which is linked to sustainable development outcomes (Figure 1.3) is applied in all decisions relating to waste management by implementing the following: -

- i. *Avoidance and reduction*: minimise waste components, quantity and toxicity of waste generated during the production process.
- ii. *Re-use*: remove waste from the waste stream for use in a similar or different purpose without changing its properties.
- iii. *Recycling*: separate articles from the waste stream and processing them as products or materials.
- iv. *Recovery*: reclaim particular components or materials or using the waste as fuel.
- v. *Disposal*: As a last resort, treat and / or dispose of waste that enters the lowest level of the hierarchy, depending on the safest manner for its final disposal (Transnet SOC Ltd, 2015a).

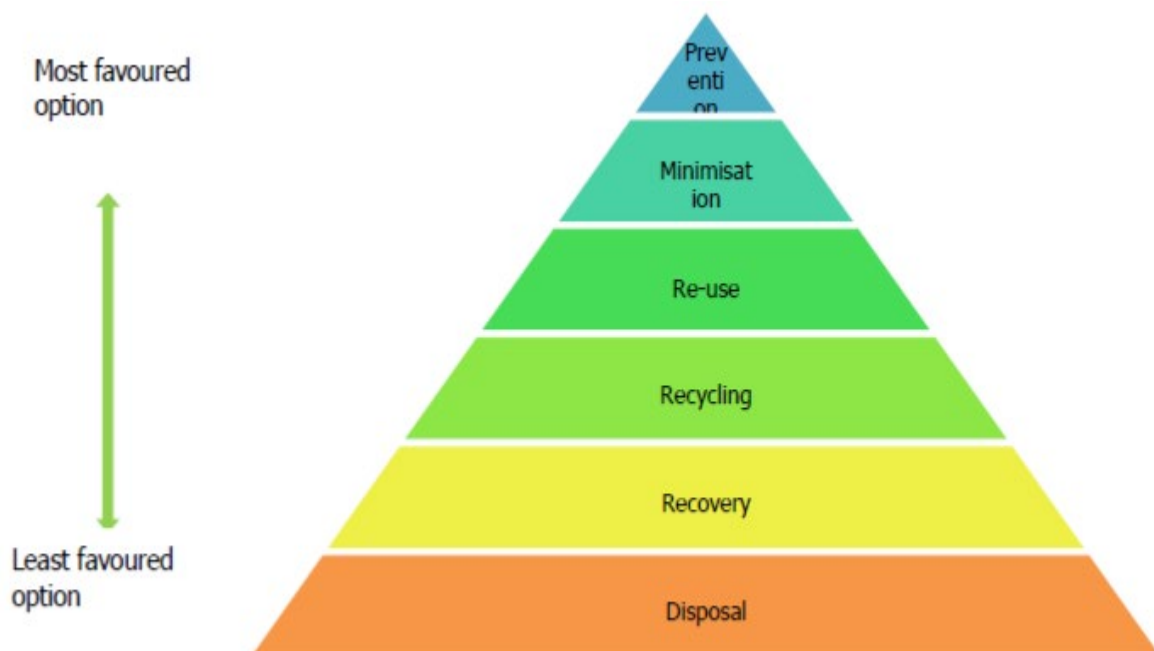


Figure 1.2: The Waste Management Hierarchy. Source (Transnet SOC Ltd, 2015a)

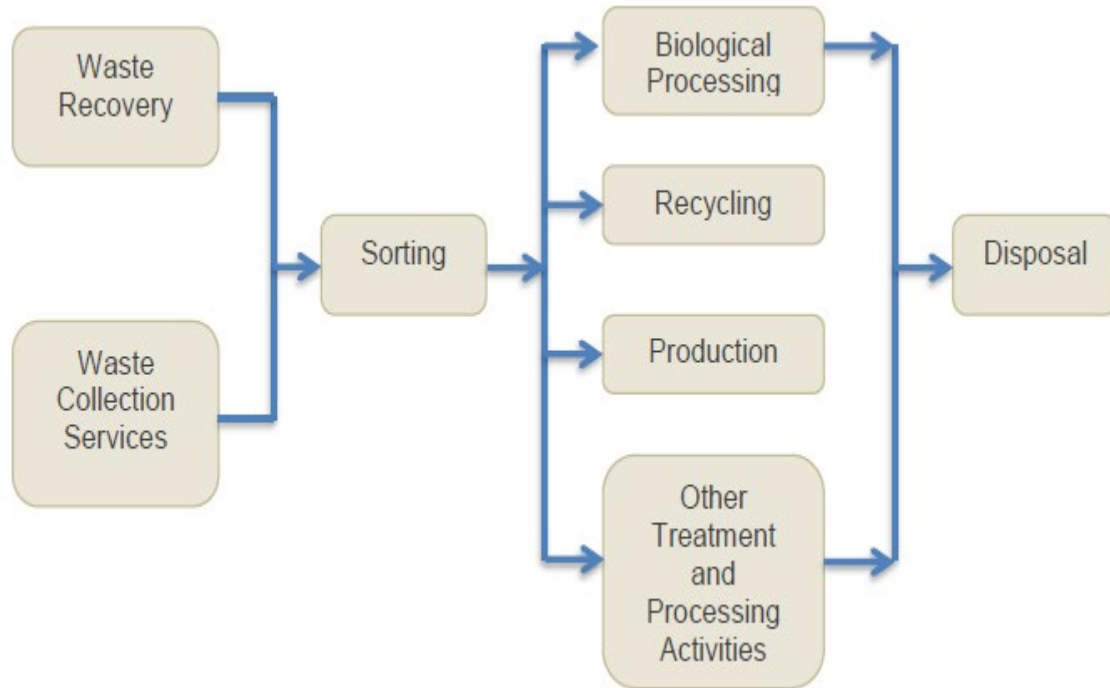


Figure 1.3: Linking sustainable development outcomes with the waste management value chain. Source: Transnet SOC Ltd. (2015a)

Globally sustainable environmental practices in ports have been linked to socio-economic benefits. Most African ports are increasingly acknowledging environmental issues and starting to address these in environmental policies (Puig & Darbra, 2019). There is no doubt that the issue of improper waste and pollution management are serious impediments to the achievement of the sustainable development goals (SDGs) (Elsheekh *et al.*, 2021, Ezbakhe, 2018). Ports and port facilities are centres of intense human and environment interactions where multi-million-dollar businesses are functioning. Proper environmental management in ports is, however, not always given priority attention. Multiple factors have been identified as potentially contributing to seaport challenges, including institutional limitations, financial constraints, limited human and technical capacity, confusing multiple layers of legislation, and sometimes unpromulgated legislation (Katuwawala & Bandara, 2022; Melato *et al.*, 2025). Evolving a sustainable approach to manage these issues can also lead to progress at achieving these goals. Many African ports are still struggling with effective implementation of sound waste and pollution management practices in seaports. Thus, sound environmental knowledge and attitude can yield desirable environmental

behavioural outcomes, in the case of the current study, in relation to waste and pollution management in the Port of Cape Town.

1.8 PERCEPTION OF POLLUTION, ITS RISKS AND ENVIRONMENTAL MANAGEMENT

Just as beauty is judged to be in the eye of the beholder, so is pollution constructed by all senses of the perceiver (Egan, 1999). Mary Douglas uses the term “dirt” as a synonym for pollution (Douglas, 1996). In the study conducted by Egan (1999), this term was used in various forms by the participants in their description of how they perceive pollution. The western idea of dirt is dominated by the knowledge of pathogenic agents (Douglas, 1984). Hence, in order to get rid of dirt (disorder) the environment needs to be cleaned. Egan (1999) explains that this may be seen as a positive, creative action which makes the achievement conform to the culture of the idea of cleanliness.

According to Gitlin (1980) whatever is perceived by people is organised into patterns conceived by them. Individuals approach issues through their own unique and cultural lenses and a structure is formed that creates a set of assumptions. The act of perceiving is not simply a passive effort. In perceiving the process that takes place is to accept and reject cues according to their fit into the pattern. Unclear cues are treated as if they matched with the familiar, nevertheless obviously conflicting ones tend to be rejected. Facts which may be correlated but do not fit into the categories we are devising, we tend to ignore, so that they do not interrupt recognized assumptions. When anomalous cues are accepted, assumptions may need to be modified. That is, accommodating a new experience, label it, and take ownership of it. As these new experiences accumulate, we gain more confidence in our refined assumptions (Douglas, 1984).

Zube (1991) argued that people can only relate to environmental concerns if they are concrete and experienced close to them. Perception of risk can address how people perceive risk in relation to their environmental, social and health concerns (O’Neil & Kaufert, 1990).

Many companies within all sectors of the economy have started to understand that their attitude towards the environment has acquired the nature of a decision, with far reaching consequences. This is as far as the economic, political and social environment that has environmental issues into vital strategic factors, creating not only capacity of a company to generate value for its shareholders, but also its ability to manage the risks relating to that capacity. It is increasingly evident that the impact of businesses on the environment can lead to risks that, in turn, can have major impact on their economic and financial performance (García-López *et al.*, 2012).

Risk is always perceived by somebody; it is never simply presented. Risks in western cultures are usually taken as quantitative measures of hazard consequences, and expressed as probabilities (Egan, 1999). Douglas (1990) suggests that a “culture needs a common forensic vocabulary with which to hold persons accountable” and risk is a word that could fit into that lexicon. To execute its full use, a word must be understood by members in a particular cultural context. Today, it seems that “risk” is generally accepted as having only negative outcomes (Egan, 1999). Some risks are more difficult to accept than others, including those that are involuntary, uncertain, unfamiliar, and potentially catastrophic (Fischhoff *et al.*, 1981).

The management of environmental pollution is a progressively more complex subject, both politically and scientifically. Decisions to be implemented by the environmental pollution manager must be informed by up-to date scientific knowledge and yet taking into account social and political factors in the decision-making (Farmer, 1997).

Farmer (1997) stated that there are many motives why uncertainty exists in dealing with the management of environmental pollution. Six reasons mentioned, include:

1. Lack of time to collect sufficient information. Very often decisions need to be taken, and it simply may not be possible to obtain the necessary data to sufficiently reduce uncertainty. This is true especially when examining longer term impacts, e.g. chronic health problems, effects of low-level radiation or subtle changes to ecosystems.
2. Some environmental systems are so overly complex that our ability to predict their responses is extremely limited.

3. Some aspects of the environment are still poorly understood. This is particularly so for the maritime environment.
4. It may be possible to undertake experimental studies to obtain sufficient information. However, this might mean manipulating the very aspects of the environment that one is concerned about. This defeats the purpose of pollution regulation.
5. There may be significant practical problems in obtaining data. For, example, one may need to deal with remote sites, deep seas or subsections of the human population that are difficult to identify.
6. The costs of obtaining sufficient information may outweigh the economic benefits of discharging the pollutants.

There is a close relationship between anthropogenic activities and the environment. Businesses are also aware of this relationship, for they are not only polluting agents, but also agents with the ability to reduce adverse environmental impacts (García-López *et al.*, 2012). In terms of the socially responsible measures to be taken by the organisations, the employees can play a pertinent role. Proactive environmental management can also reduce costs through better use of inputs, reduction of waste disposal costs, and removal of unnecessary steps in production processes (Berrone & Gomez-Mejia, 2009).

Normally waste management system refers to a precise technique strategy, or tool used to treat waste materials. This may include the collection, transportation, recycling, disposal or processing of waste. The use of waste management systems differs according to both the kinds of waste material to be treated and the aims of the treatment itself. In general, waste management systems try to curb waste for reasons such as public health threats, environmental concerns, and the general appearance of a location (Twardowska & Szczepanska, 2002).

1.9 THE NATURE OF ATTITUDES, BEHAVIOUR AND AWARENESS

Attitudes are continuing mental illustrations of numerous features of the social or physical world. They are learned through experience and has an influence on subsequent behaviour. Attitudes serve vital roles for the persons who hold them (e.g.

they help in the processing of social information and allow individuals to express their basic values) (Baron & Byrne, 1991). Kollmuss and Agyeman (2002) stated that direct experiences have more influence on individuals' behaviour rather than indirect experiences. According to Oreg & Gerro (2006) pro-environmental behaviour is believed to be an outcome of knowledge, cast into attitudes and operationalized as a precise behaviour.

Baron and Byrne (1991) stated that attitudes are connected to behaviour, but this relationship is not simple. Exact attitudes predict behaviour better than general ones. Likewise, strong attitudes, or ones that individuals have vested interest in, are more intricately connected to behaviour than weak or irrelevant ones. Behaviour is a stipulated action and the resultant product of knowledge and attitude (McKenzie-Mohr & Smith, 1999) and turns into the belief system followed by an individual (Oreg & Gerro, 2006).

Attitudes can be applied indirectly, from other persons, through social learning. This process includes three basic forms of learning: classical conditioning, instrumental conditioning and modelling. Attitudes can also be applied directly, through personal experience. Such attitudes tend to be stronger than ones acquired through social learning (Baron & Byrne, 1991).

In many cases, lack of awareness and complacency for proper disposal of waste can exacerbate environmental problems (Tukahirwa *et al.*, 2011). Awareness amongst organisations shows a process of changeover from perceiving environmental efforts as one factor among many affecting an organisations performance to raising such efforts to the point of a major strategic factor (López-Gamero *et al.*, 2010). The increase in environmental awareness in society developed principally towards the end of the 1970's. This increased environmental awareness demanded that public authorities address the accountability of companies causing severe environmental impacts through pollution. Due to this, companies have started to take measures to internalise the external effect their activities have (García-López *et al.*, 2012).

Environmental regulation is the most effective mechanism enabling companies to internalise the effects of their activities on the natural environment. However,

compliance with environmental regulation requires companies to implement adaptation processes that are not only costly itself but also affect their competitiveness and future profits because these companies must modify production systems and methods (Canon-de-Francia *et al.*, 2007). Research has shown that management commitment to environmental concerns is a powerful internal political force (Drumwright, 1994) that reflects those managers' ideals, values, and even lifestyles. This will have a direct effect on the degree of commitment to the environment, which will eventually determine the development of environmental orientation and strategies by companies (Fineman, 1997). The increased public awareness of environmental issues and the growing belief that environmental strategies can become a key source of competitive advantage is crucial to successful environmental management in companies (Berrone & Gomez-Mejia, 2009).

The significance of a participatory culture also emphasises the level of commitment by, and awareness of employees. This awareness and commitment are higher when individuals are given the opportunity to join in the decision-making process. This gives a sense of ownership (Theyel, 2000). Communication makes it possible for everyone to realize how important it is to adopt pollution management strategies (Hoffman, 1993).

1.10 STATEMENT OF RESEARCH PROBLEM

According to the Environmental Management Department (EMD) of the Transnet National Ports Authority (TNPA) there are numerous environmental challenges that ports are faced with in Southern Africa (EMD, 2014). The Port of Cape Town is not excluded from those challenges. Environmental pollution in this port is an on-going problem due to various activities conducted within the port premises and in surrounding areas, without much care to the environment by port users. This environmental negligence has present and potential future consequences. Waste generation and pollution are of the greatest challenges. The concern is experienced in: (i) the dry docks used for ship repairs; (ii) in the general dock water with waste continuously received from outside the port environment from the city surroundings, via the Salt River, and also storm water flowing into the port; (iii) open trenches and rubble in the construction areas; (iv) waste discarded on the quay sides by berthed

vessels; (v) port open areas with illegal dumping; (vi) as well as, onsite contractors and tenants contributing to contaminating the environment during their operational activities. With reference to tenant management, most of the leasing agreements, when elapsed, in the majority of cases, result in the areas being left contaminated. Although there are regular cleaning operations, including major port clean ups, on an *ad hoc* basis, after a few months the waste and pollution accumulates again. According to Arabi *et al.* (2022), many African ports struggle with these issues, while there are multiple factors that potentially contribute to these environmental challenges (Trozzii & Vaccaro, 2000; Lawer, 2019; Lawer *et al.*, 2019; Romero *et al.*, 2014), missing a holistic approach for effective implementation of sound sustainable waste and pollution management practices (Arabi *et al.*, 2022, Taljaard *et al.*, 2021). Therefore, there is a need for a holistic conceptual framework to sustainably address port waste and pollution challenges (Figure 1.4). Without understanding the port user's attitudes, knowledge and perception, it is likely that the current practices will continue, despite the laws, standards and legislation in place. This is a risk to the port and its surroundings. The consequences may be irreversible in terms of long-term environmental damage and may result in the potential loss of funds for TNPA due to remedial actions.

1.11 RESEARCH QUESTION

- What is the environmental knowledge, attitudes, perceptions and practices of Port of Cape Town users as it pertains to waste and pollution management?

1.12 AIM OF THE RESEARCH

- The aim of the study was to undertake an analysis of the knowledge, attitudes, perceptions and practices of Port of Cape Town users pertaining to waste and pollution management. The main focus was to ascertain and evaluate the sensitivities of port users towards environmental degradation or protection in the port, and how this data can be utilised by port authorities to construct a positive environmental strategy for the port and explore the possible opportunities to achieve effective waste and pollution management.

1.13 RESEARCH OBJECTIVES

- To determine the levels of awareness and training of port users regarding waste and pollution management (Chapters 3, 4).
- To determine the knowledge, attitudes, perceptions and practices of port users regarding waste and pollution management (Chapters 5, 6, 7, 8).
- To identify the potential barriers and opportunities for the port as it pertains to waste and pollution management (Chapters 3, 4, 5, 6, 7, 8).
- To assess and evaluate the roles of relevant stakeholders (City of Cape Town, Western Cape government, National Government) other than port users in waste and pollution management in the port (Chapters 3, 4, 5, 6, 7, 8).

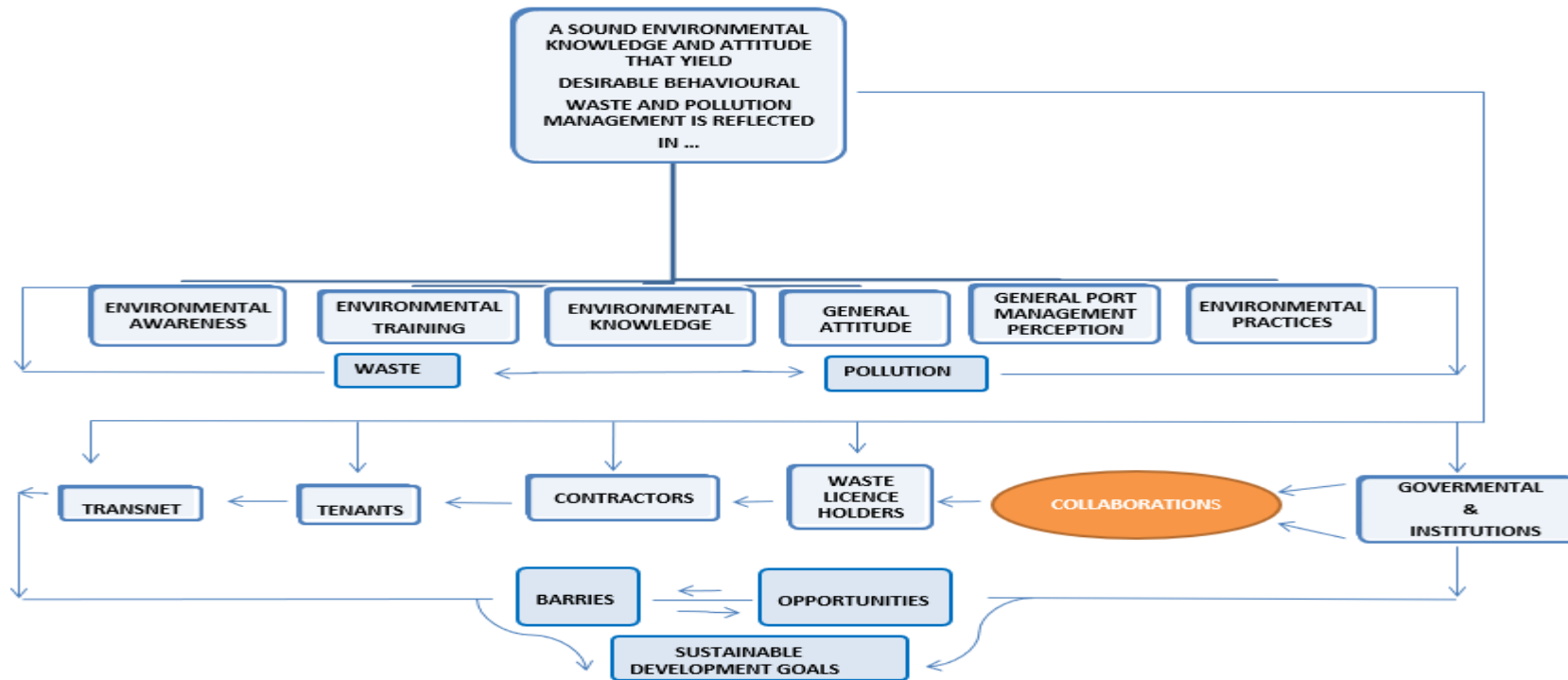


Figure 1.4: A conceptual framework flow chart of environmental knowledge, attitude, perception and practices that can yield desirable waste and pollution management outcomes. Source: Aupaki Michael Melato

RESEARCH DESIGN AND METHODOLOGY

2.1 INTRODUCTION

This chapter explains the methods and tools which were applied in order to conduct this investigation. It stipulates the research design, sampling procedure, research instruments and sources of data. Furthermore, data analysis techniques were used to explore the perception of Port of Cape Town users as it pertains to waste and pollution management.

2.2 RESEARCH DESIGN

Research design provides the framework that directs a research project. It states detailed procedures for finding information needed to answer a research problem (Malhotra, 1978). According to Saunders *et al.* (2007) research design is also defined as the broad plan of how the questions would be answered. The descriptive research method was used for this investigation. This method is used to systematically describe a situation or area of interest in an accurate way. The design relies on public opinion surveys, fact finding surveys and status studies (Isaac & Michael, 1978).

2.3 STUDY AREA

The Port of Cape Town (33°55'S; 18°26'E) is situated at the southern corner of Table Bay and is the second oldest port in South Africa (Walmsley *et al.*, 1999) (Figure 2.1). This port has a historical background that can be traced back to 1652 when the Dutch East India Company established a replenishment station in Table Bay (WSP, 2013). The port has a 253ha land area and a 9163ha water area. The services rendered span across marine, container, general cargo, fresh produce, fishing industry, ship repair, offshore and port services with hinterland connectivity (TNPA, 2014b).

The Port of Cape Town is a multi-purpose seaport that imports and exports cargo in and out of South Africa, although the main focus of activities is the Western Cape province. The port is therefore vital for the local economy (WSP, 2013).



Figure 2.1: The Port of Cape Town in South Africa (WSP, 2013).

2.4 RESEARCH PROCESS

The methods used in this research project comprised both qualitative and quantitative methods. This was to properly analyse subjective and objective points of view in terms of the knowledge, attitudes and perceptions of Port of Cape Town users as it relates to waste and pollution management. Qualitative and quantitative research methods have both advantages and disadvantages (Ukandu, 2011). In order to reduce the disadvantages, both methods of research were implemented to reduce the limitations that may be experienced from using a single research method.

2.5 METHODS OF DATA COLLECTION

2.5.1 Questionnaires

The benefit of using questionnaires was that they were flexible and met the objectives of the research. When questionnaires are well designed, they can be administered in-person, telephonically, by using the traditional mail system, or by online means. They measure knowledge about a thing or idea or people's opinions (McNabb, 2002).

The designed questionnaires were divided into two sections, namely the demographic information and the content-based sections, where questions related to the research objectives were asked. This tool was used to achieve the objectives of the study to determine knowledge and to get an understanding of participants' attitudes, perception and practices. Furthermore, the questions asked assisted in identifying the potential barriers and opportunities with regards to waste and pollution management in the investigation. This technique prevents unethical bias. The questionnaire was designed to be completed within 20 minutes.

Self-administered questionnaires were used to collect data for the research (Appendix, A1-8). The language used for these questionnaires was English. Space was provided on the questionnaire where the respondents' opinions or comments could be written. Pencils and rubbers were provided giving "room" for respondents to reconsider their responses to questions.

In situations where language barriers were encountered, an interpreter was readily available for assistance. The interpreter has vast experience in interpreting different languages. He worked at the High Court to interpret Afrikaans, Xhosa and Sotho among other languages to and from English.

2.5.2 Interviews

In general society the interview has become part of life (Atkinson & Silverman, 1997). Interviews are highly interactional and often involve collaborative meaning-making (Doucet & Mauthner, 2008). Research interviews presume that the individual's perspective is a vital part of the fabric of society, also as our cooperative knowledge of social processes and of the human situation (Gubrium & Holstein, 2002).

Necessary arrangements were made to set up appointments for interviews with government officials in this study. Letters from the university and the Transnet National Ports Authority permit were presented. Interviews were used to obtain the story behind the participants' experiences (Appendix, A9). The language that was used for these interviews was English. The interviews were conducted for a maximum of 20-25 minutes. The time indicated was purposely set to last to this maximum time frame. According to Wegner (2000), lengthy interviews may cause the interviewee's responses to be rushed or ill-considered because of the interviewee's boredom or agitation, impacting the reliability of the gathered data. Additional supporting notes were taken during the interviews.

The interviews were conducted with the relevant stakeholders in order to assess and evaluate their roles in waste and pollution management in the port. A structured interview was used. The data from the interviews were treated as anonymous. The results are reported in such a way that no individual or sector within or out of governmental sector was identified that could be linked to the person with whom the interview was conducted. All these assisted to prevent unethical conduct.

2.5.3 Document Analysis

The internal reports of Transnet were reviewed and interpreted in order to obtain the meaning and understanding in relation to this study investigation (Rapley, 2007; Bowen, 2009). According to Atkinson and Coffey (1997) refer to documents as "social facts, which are produced, shared, and used in socially organised ways".

2.6 TARGET GROUPS

For this study the target group was Port of Cape Town users. Collis and Hussey (2003) states that a 'sample' is made up of some of the members of a 'population'. Welman *et al.*, (2005) describes a target population as the population to which the investigator idyllically would like to take a broad view of his or her results on. According to Collis and Hussey (2003) target population is defined as a set of people or collection of items which is under consideration.

2.6.1 Questionnaires

The questionnaires were distributed to the non-managerial employees (NME) and managerial employees (ME) of the following target groups.

- i. Transnet National Ports Authority
- ii. Tenants
- iii. Contractors
- iv. Waste licence permit holders

It is important to note that the NME's and ME's received separate questionnaires (Appendix, A1-8). The reason for this was to ensure that each target group received questions aligned with their specific operational responsibilities and expertise. This approach allowed respondents to provide accurate and relevant responses based on their understanding of the processes and requirements applicable to their roles as far as waste and pollution management are concerned. By tailoring the questions, the quality and reliability of the data collected were significantly improved. Appointments were made with the respective target groups to administer the questionnaires. The questionnaires were both distributed and collected at the same hour as per the appointment with the target groups. The advantage of this process is that the respondents receive all the questionnaires at that particular time. Even on those exceptional cases the time frame was granted for the submission or collection of the filled questionnaires in order to keep track of all distributions made to the managerial and non-managerial employees.

2.6.2 Interviews

Interviews were conducted with officials from relevant government departments. Representatives of the City of Cape Town's Division of Solid Waste Management (SWM) (local government) and the Department of Environmental Affairs (national government) were interviewed. The Western Cape's Environmental Affairs and Development Planning Department (provincial government) did not participate in this study although they were requested to take part. During the discussions with the Western Cape provincial government, it was indicated that port environmental matters are dealt with at national and local government levels, not at provincial level. For this reason, they were excluded from the investigation of this study.

2.7 POPULATION AND SAMPLING

The population under investigation in this study was the Port of Cape Town (TNPA, tenants, contractors and waste licence permit holders). A requirement was that the selected companies must have been operational for at least six months at the port. The population included part-time, casual and full-time workers. The total population size for this study from these target groups was 801 (100%) for both managerial and non-managerial employees. The number of managerial employees was 165 (21%) (Appendix A10.1), while the number of non-managerial employees was 636 (79%) (Appendix A10.2).

The survey research method was used in this study to obtain a good representation of the population. The participants that were included in this investigation have a direct impact on the purpose of this study.

2.8 SAMPLE SIZE AND CONFIDENCE INTERVAL

In order to determine the precise sample size for each organisation and also to calculate the confidence interval and the confidence level, the survey system calculating the sample size was used for all participating organisations (Fig: 2.2). Ali (2012) states that calculating and justifying sample size for a study is one of the most significant aspects of any research. In calculating sample size for the studies there are numerous statistical software and online websites which can assist the researchers. For this study system survey calculation online was used (Fig. 2.2) (Creative Research System, 2016).

Determine Sample Size

Confidence Level: ☒ 95% ☐ 99%

Confidence Interval:

Population:

Sample size needed:

Determine Sample Size

Confidence Level: ☒ 95% ☐ 99%

Confidence Interval:

Population:

Sample size needed:

Find Confidence Interval

Confidence Level: ☒ 95% ☐ 99%

Sample Size:

Population:

Percentage:

Confidence Interval:

Find Confidence Interval

Confidence Level: ☒ 95% ☐ 99%

Sample Size:

Population:

Percentage:

Confidence Interval:

Sample Size Calculator Terms: Confidence Interval & Confidence Level

Sample Size Calculator Terms: Confidence Interval & Confidence Level

Non-Manual Employees

Managerial Employees

Figure 2.2: Survey system calculating the sample size of each organisation and calculating the confidence interval and confidence level. Source: Creative Research System (2016)

According to Ali (2012) while calculating sample size, the final thing to decide on is the significance level. Most scientists in general, accept the alpha error of 5% in their studies. Alpha error of 5% is also written as a significance level of 95%. The current study adopted the principle of Ali (2012) as stipulated for 95 percent (95%) level for all calculations of each organisation for both managerial employees and non-managerial employee's participants.

2.9 SAMPLING PROCEDURES

Purposive sampling was used for this study to all participating organisations (Shil *et al.*, 2013) because it allows for selecting people who are 'typical' of a group, or those who represent diverse perspectives on an issue (Watkins, 2008). The reason purposive sampling is used for this research is because the research focuses on a small sample with the main focus to obtain 'rich data' (Welman *et al.*, 2005).

2.9.1 Transnet National Ports Authority Sampling Procedure

The TNPA employees at the Port of Cape Town totalled 680 at the time the investigation and data collection took place. The managerial employees (ME's) (includes supervisors to the senior managers) were 114, while the non-managerial employees (NME's) were 430. Some employees were excluded from the data collection process (136). They were office-based employees such as secretaries, human resource officers, administrators, occupational nurses, labour relation officers, payroll personnel and financial officers. All the employees falling under these identified disciplines were considered not relevant to achieve the objectives of the research. In order to determine an acceptable sample size based on the population, the online survey system sample size calculator was used (figure 2.2) (Creative Research System, 2016). This calculation resulted in a ME sample size of 89 and an NME sample size of 203 (95% confidence level and confidence interval of 5). However, due to interest from the employees, the sample size for MEs increased to 93 and the NME's increased to 306.

2.9.2 Contractors Sampling Procedure

Some of the contractors working in the port premises were selected to take part in the study. It was difficult to select the contractors in advance because some of them were not based at the port for a very long time (sometimes a few days to a few weeks at a time). They would come to the port for work to be done and leave as soon as the job is done. More often most of the contractor companies relevant to this study would spend a short period of time and leave the port, depending on the scope of work. Due to this, it was challenging to select contractor companies to take part in the study before the data collection happened. However, a total of nine contractor companies participated in the survey. According to Survey System principle outlined at figure 2.2 (Creative Research System, 2016), all the population members were required to be part of the sample. The total number of participants was 27 managerial employees, and 105 non-managerial employees.

2.9.3 Tenants Sampling Procedure

The Port of Cape Town has a large number of tenants providing a wide range of activities relevant to the port's functions. At the time of the investigation, there were about 121 tenant lease agreements in the Port of Cape Town. Their activities varied from engineering works providing a service to the shipping industries, restaurants, the import and export of dry bulk, as well as government departments offering services to the port users. This creates a situation where a wide spectrum of people with different skill sets work at the port. Most of tenants are privately owned companies. There are, however, some government departments at the port due to the services that need to be rendered to the public, such as tourists.

The purposive sampling technique was used to select the tenants to take part in the study. The selected tenants were companies with a lease of at least five years. Also, they had to be at least two years in operation before the lease elapsed. The selection further preferred tenants with daily activities that have the potential to negatively impact the port environment. Out of 121 tenants, 12 companies were selected to take part in data collection due to their operational activities being environmentally related and relevant in terms of the objectives of this study.

Of the 12 companies selected, 33 were ME's, while 152 were NME's. The use of the survey system (figure 2.2) (Creative Research System, 2016) resulted in a sample size calculation of 29 ME's and 109 NME's (95% confidence level and confidence interval of 5). However, the employees showed an interest in being part of the study. Therefore, the sample size ended up being 33 ME's and 152 NME's.

2.9.4 Waste Licence Permit Holders Sampling Procedure

The TNPA is the custodian of National Ports Act (Act No. 12 of 2005). Section 58 of this Act deals with licences that the port authority issues to port operators. The companies that manage waste in the port are required to obtain a waste licence permit from the TNPA. The permit is issued according to the type of service rendered by the applicant (Republic of South Africa, 2005). At the time of data collection, 19 waste licence permit holders (WLPH's) were registered with the Port of Cape Town. Of the 19 WLPH's, 6 were selected to take part in the study. These companies were selected because of the nature of the services they rendered (Appendix A11). They handled all

types of services as per the waste license conditions. These included: (a) collection and transport; (b) provision of waste receptacles; (c) maintenance activities; (d) recycling waste oil; (e) recycling other waste.

Due to the small population size, all the employees were included in the investigation (Creative Research System, 2016): 85 participants in total, consisting of 12 ME's and 73 NME's.

2.10 STATISTICAL ANALYSIS

This was an explorative descriptive study, and statistical analysis was done using SPSS (Statistical Package for Social Science) software programme and Microsoft Office Excel (Shil *et al.*, 2013, Appendix A10.1&2; Appendix A12.1&2). As the data consisted of non-parametric ordinal and nominal data, the chi square analysis was used to search for statistically significant influences of independent variables on dependent variable.

2.11 PILOT STUDY

A pilot study was conducted before the full-scale study. It was important to test the data collection instruments (questionnaires and interview questions) before issuing it to the full sample. This was done to determine if the questionnaires and interview questions were feasible and practical in accomplishing the objectives of the study (Babbie & Mouton, 2001; Leedy & Ormrod, 2005).

In order to determine the validity of the questionnaire, essential for the survey section of the investigation, a preliminary study was conducted. Participants from different language groups (Afrikaans, English and Xhosa) were chosen for the pilot study. It was important to consider the need for an interpreter for the study should there be any language barriers. The questionnaires and interviewed questions were administered to the pilot study group and comments were collected in relation to the questions so that improvements could be made. The questionnaires were coded as they were received from the participants. The principal investigator then attended to the comments and suggestions provided by the participants. Necessary adjustments were

made to improve the questions. These participants were excluded from the main study.

2.12 ETHICAL CONSIDERATIONS

Research ethics is a vital component of academic research (Udo-Akang, 2013). The researcher is required to do research in an ethical manner in the search for truth and knowledge (Mouton, 2001). The researcher acquired ethical clearance from the faculty ethical committee of the university (Leedy & Ormrod, 2005; Appendix A13). A data collection permission letter to conduct the study was also provided by the Transnet National Ports Authority Executives (Appendix A14).

The principal investigator (PI) is an employee of Transnet. However, measures were put in place to ensure that the position of the PI does not compromise the investigation. Transnet provided the necessary time for the collection of data. Analyst triangulation was done using the supervisors to reinterpret the information from a non-Transnet perspective in search of any form of bias in the interpretation of the data. The Protection of Personal Information Act (Republic of South Africa, 2013) also specifies the significance of safeguarding the identity privacy and confidentiality of people. Therefore, the PI and supervisors took measures to comply with this Act. The identities of participants were protected by keeping all data collection processes anonymous. An informed consent letter was also used to ensure participants that their identity will be protected and that everything will be done anonymously etc (Appendix A15)

2.13 DELINEATION OF THE RESEARCH

This study focused on the Port of Cape Town users in the City of Cape Town only. The study did not involve the rest of the ports in South Africa, although they are all governed by Transnet National Ports Authority. The focus was on the perception of port users and not on quantification on assessing of waste and pollution in the port. During the interview process only two governmental department levels that play strategic roles in the management of waste and pollution in the port took part on this study. The provincial department was excluded because their mandate did not include the ports at the time of the survey.

AWARENESS

ABSTRACT

Environmental awareness may possibly be defined as a state of being aware, having knowledge around, and being conscious of all of the surrounding things, conditions and influence affecting the growth or development in a port working environment. The aim of environmental education is to improve a population that is aware of and “concern” about the environment, its related problems, so that the society may be well informed and have the knowledge, necessary skills, required attitude, motivation and commitment from individuals to work on their own and also working together towards finding the solutions of the existing environmental challenges and ways to prevent the emanating ones. In order for the environment to be supported for their protection this depends on the level of environmental awareness. The current study was to ascertain the level of awareness from the cape town users especially in waste and pollution matters. Furthermore, to engage the government to understand the role they are playing in support of the industries for environmental issues in awareness. The data has been analysed by using SPSS 25 software programme and Microsoft Office Excel. The port users are generally aware of the port environmental conditions with a view that littering and port clean-ups were important issues that came to mind regarding waste and pollution. They were also aware of the illegal dumping taking place in the Port of Cape Town, which has a potential negative environmental impact. It therefore seems as if Transnet, as landlord, does not have a clear management strategy to address littering and the awareness of its impact in the port. There is notable awareness in terms of recycling at the workplace and the financial benefits thereof. The local government officials felt that collaboration on awareness programmes is not sufficient. The contractor group were found to be the highest leading organisation in ME’s response in all the environmental awareness programmes compared to the rest of the managers in other organisations.

3.1 INTRODUCTION

According to the World Book Dictionary the “environment” in the context of a port can be ‘all of the surrounding things, conditions and influence affecting the growth’ or development in a port working environment (Barnhart, 1982; Stahl, 2013). “Awareness” refers to ‘the state or condition of being aware; having knowledge; consciousness’ (Anonymous, 2013). Madsen (1996) emphasized the concept that awareness is the ultimate driving force that stimulates knowledge. There is acknowledgement that the problem does exist in the environment which lead individuals to be more cognizant of the facts concerning the state of that environment. “This degree of environmental awareness involves a personal commitment to work to solve environmental problems”. Subsequently, “environmental awareness” can be described as a state of being aware, having knowledge around, and being conscious of all the surrounding things, conditions and influence affecting the growth or development in a port working environment. Nagra (2010) noted that environmental awareness “involves creating knowledge and understanding among individuals and social groups about the environment and environmental protection”.

In the last few years, the workplace has been gradually more recognised as an appropriate environment for learning new skills and knowledge, which in turn empowers employees to partake more successfully in an ever-changing work environment (Le Clus, 2011). The transition from school or tertiary institutions of learning to the workplace are not as straightforward as they were in years gone by (Manuti *et al.*, 2015). Research shows that the workplace can be a rich environment for learning (Hager, 1998; Hager 2001; Beckett & Hager 2002; Boud & Middleton, 2003; Manuti *et al.*, 2015).

In the ever-changing work environment, the eventual aim of environmental education, whether it is formal, informal and/or incidental learning is to create an awareness of the workplace environment (Marsick & Watkins, 1990; Marsick & Volpe, 1999; Foley, 1999; Hager & Halliday, 2006; Shil *et al.*, 2013). Tanner (1980) gives emphasis on the basic aim of environmental education. It is to improve a population that is aware of and concerned about the environment, its related problems, so that the society may be well-informed and have the knowledge, necessary skill, required attitude,

motivation and commitment from individuals to work on their own and also working together towards finding the solutions for the existing environmental challenges and ways to prevent new ones. For the environment to be supported for its protection this depends on the level of environmental awareness (Kokkinen, 2013).

Dietz *et al.* (2005) reflected on the word 'concern'. It reveals both a sense that something is significant and a belief that something may possibly be at risk. Stern *et al.* (1993) suggested that environmental concern is triggered by a combination of these three factors: egoistic orientation, social orientation and (biospheric orientation). Stern *et al.* (1993) further indicated that the egoistic orientation is concerned with the elimination of suffering and harm from oneself, social orientation is concerned with the elimination of suffering of other people, and the biospheric orientation is concerned with the elimination of destruction and suffering in the non-human world.

Borden and Francis (1978) argued that egoistic orientation can only be a motivator for pro-environmental behaviour if the action serves the person's own needs and wants. By pro-environmental behaviour it merely means the behaviour that consciously seeks to minimize negative impact of one's actions on the natural and built world (for instance, reduction of waste production, minimizing the resources and energy consumption and the use of non-toxic substances) (Kollmuss & Agyeman, 2002). Awareness is a crucial aspect causing possible attitude-behaviour relationships (Karatekin, 2014). In the study conducted by Kağıtçıbaşı (2010) it is clearly indicated that high awareness reinforces the overlap between attitude and behaviour. Attitude does not necessarily determine behaviour directly, rather they influence behavioural intentions which in turn shape our actions. Intentions are not only influenced by attitude but also by social pressures (Kollmuss & Agyeman, 2002). Eagly and Kulesa (1997) noted that in campaigns for recycling influential requests over the media showed tremendous impact on people's attitude and behaviour.

Awareness has been recognized as a significant tool to engage employees in operation, management and corporate risk (Abid, 2013) and encourages employees to develop environmental awareness and make environmentally responsible decisions in the workplace (Baumgartner & Winter, 2013). According to Zilahy (2003) organisation efficient improvement measures on the environment rely on the

organisation's ability to implement environmental awareness in providing adequate knowledge through training programmes. Additionally, it is further stated that environmental awareness is one of the utmost vital organisational forecasters of the level of environmental measures embraced by the organisations. In the study conducted by Karatekin (2014) it was stipulated that the sources of low awareness of solid waste recycling were the result of negative feelings and thoughts, inadequate education and inadequate knowledge. Bird (1996) suggested that environmental training and education empowers workers to build motivation on the backbone of a strong awareness of the significance and prominence of environmental concerns for the individual and organization, and further to improve knowledge and skills that favour actions and decisions regarding the environment and reduce the environmental impacts of work.

The research objectives as it relates to this chapter are:

- To ascertain the level of awareness of the Port of Cape Town users, especially in waste and pollution matters.
- To identify the potential barriers and opportunities for the port as it pertains to waste and pollution management.
- To assess and evaluate the roles of relevant stakeholders (City of Cape Town, Western Cape government, National Government) other than port users in waste and pollution management in the port.

3.2 RESULTS AND DISCUSSION

This section presents the results of the data collected from the survey conducted on different Port of Cape Town users. Transnet refers to the Transnet National Ports Authority (TNPA).

The target groups for the study were contractors, tenants, Transnet and waste licence permit holders (WLPH's), as well as selected government departmental officials, as explained in chapter 2. Self-administered questionnaires were used for managerial employees (ME's) and non-managerial employees (NME's) of the four target groups. Structured interviews were used to collect data from government departmental

officials. The collected data was tabulated and coded (Appendix A10 1&2). An explorative descriptive study and statistical analysis was done by using SPSS 25 software and Microsoft Office Excel (Shil *et al.*, 2013, Appendix A12.1&2). The data mainly consists of non-parametric ordinal and nominal data. The chi square analysis was used to search for statistical significant influences of independent variables on dependent variables.

In the questions the respondents were requested to tick all that apply. Therefore, it should not be expected for the columns to add up to 100%, especially for Tables 3.2.1 - 6 (Appendix B1.1&2).

3.2.1 Understanding of all target group as it relates to waste

Table 3.2.1. Responses of managerial employees (ME's) from all the target groups regarding the question: "Think about waste. What comes to mind?"

	Options	Group: Difference: $\chi = 28.133$, df = 21, p-value >0.005							
		Contractors		Tenants		Transnet		Waste Licence Permit Holders	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
Think about waste: What comes to mind?	Littering	17	63.0%	17	51.5%	61	65.6%	6	50.0%
	Port clean-up	6	22.2%	7	21.2%	6	6.5%	0	0.0%
	Recycling	5	18.5%	7	21.2%	17	18.3%	3	25.0%
	Illegal dumping	4	14.8%	4	12.1%	18	19.4%	0	0.0%
	Oil spill	1	3.7%	2	6.1%	7	7.5%	1	8.3%
	Disease	1	3.7%	3	9.1%	2	2.2%	1	8.3%
	Others	2	7.4%	1	3.0%	0	0.0%	1	8.3%

Table 3.2.2: Responses of non-managerial employees (NME's) from all the target groups regarding the question: "Think about waste. What comes to mind?"

	Options	Group: Difference: $\chi = 64.860$, df = 21, p-value <0.001							
		Contractors		Tenants		Transnet		Waste Licence Permit Holders	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
Think about waste: What comes to mind?	Littering	40	38.1%	41	27.0%	78	25.5%	14	19.2%
	Port clean-up	46	43.8%	82	53.9%	183	59.8%	30	41.1%
	Recycling	11	10.5%	9	5.9%	20	6.5%	7	9.6%
	Illegal dumping	16	15.2%	21	13.8%	30	9.8%	7	9.6%
	Oil spill	1	1.0%	5	3.3%	6	2.0%	10	13.7%
	Disease	1	1.0%	6	3.9%	7	2.3%	4	5.5%
	Others	2	1.9%	5	3.3%	17	5.6%	5	6.8%

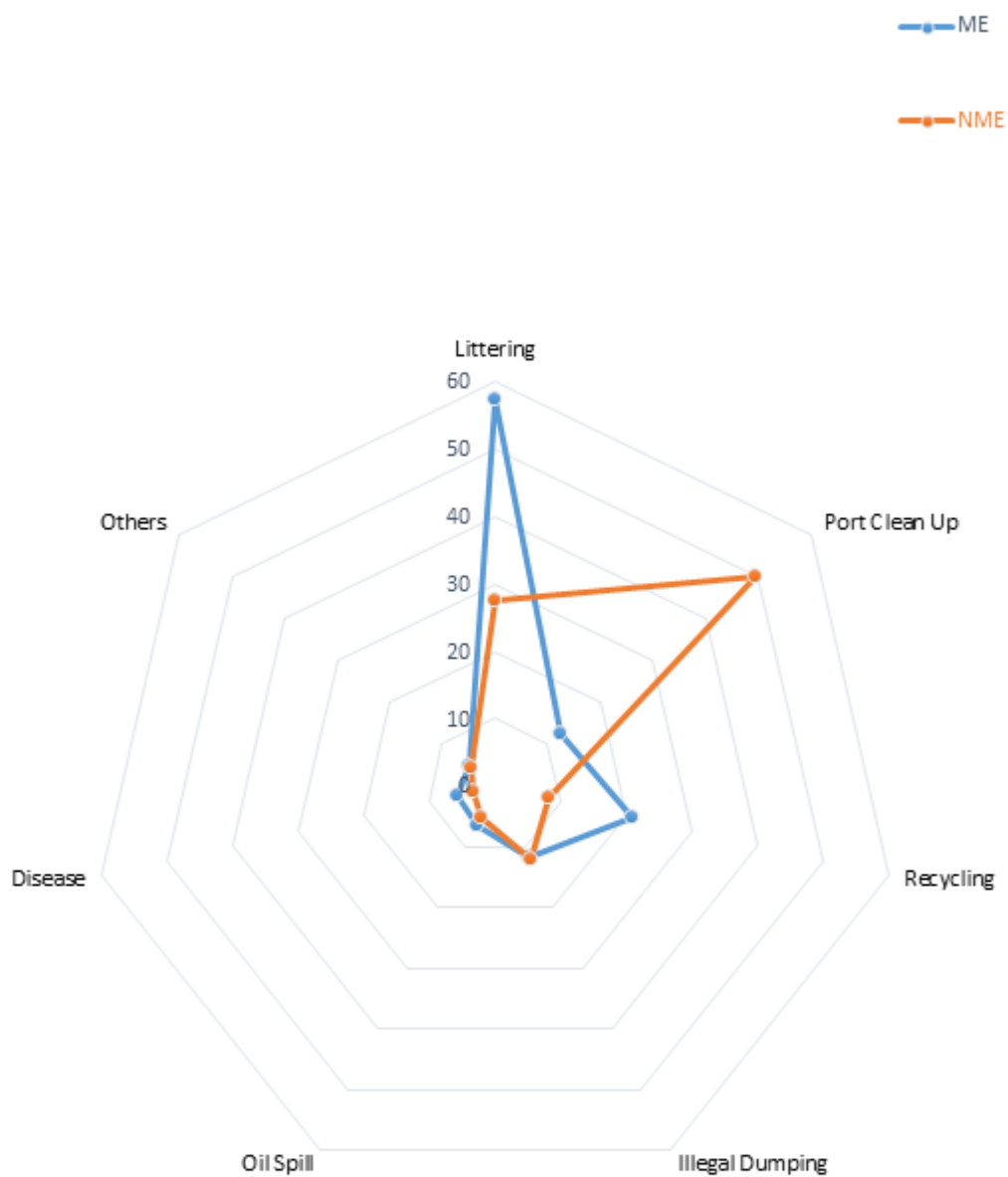


Figure 3.2.1: An illustration of the pooled response percentages of all the target groups (ME's and NME's) regarding the question: Think about waste, what comes to mind?



Figure 3.2.1a: An illustration of the response percentage of Contractors group (ME's and NME's) regarding the question: Think about waste, What comes to mind?



Figure 3.2.1b: An illustration of the response percentage of Tenants group (ME's and NME's) regarding the question: Think about waste, What comes to mind?



Figure 3.2.1c: An illustration of the response percentage of Transnet group (ME's and NME's) regarding the question: Think about waste, What comes to mind?

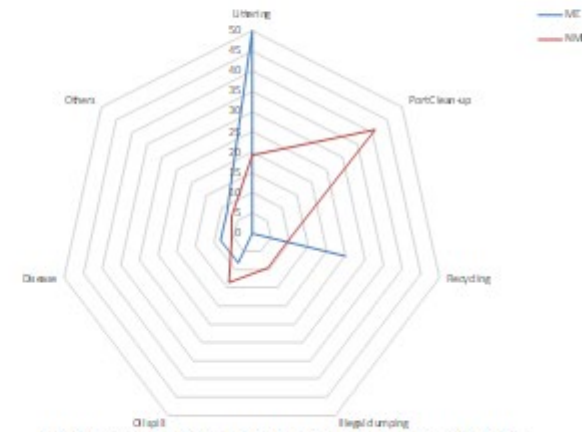


Figure 3.2.1d: An illustration of the response percentage of WLPs group (ME's and NME's) regarding the question: Think about waste, What comes to mind?

3.2.1.1 The ME's response in relation to the question: "Think about waste. What comes to mind?"

There were no statistical significant differences within the managerial employees (ME's) from all the target groups regarding question "Think about waste. What comes to mind?" ($P > 0.005$) (Table 3.2.1).

The ME's understanding revealed "littering" as the most prominent response to this question in all the target groups (Transnet 65.6%, Contractors 63.0%; Tenants 51.5%; WLPH's 50.0%) (Table 3.2.1; Figure 3.2.1; Figure 3.2.1a-d).

There are times when the Port of Cape Town environment is unsightly due to litter being visible in the area (Appendix B1.3). In most instances litter can be seen within the premises of the port, like the dry docks, port fence, around waste reception facilities due to bins overflowing with waste, in corners of the dry dock yards, in tenants' yards and sometimes in the operational areas. The operational areas are places in a port environment like workshops, dry docks, dredging activities, road construction and perway activities, except office workspaces. In various areas of the port, illegal dumping contributes to littering. Apart from the above, there is also litter in the port area that seems to have originated from the surrounding city environment. The Port of Cape Town and the surrounding city environment are only divided by a wire fence. Whenever litter accumulates outside the port's perimeter fence it eventually enters and impacts the port environment itself. Litter also finds its way into the port environment via storm water drains and the Salt River (Appendix B1.4). On windy days litter becomes even more visible in the port premises.

According to Hing and Gunggut (2012), the lack of a clean environment more often is due to littering. Law *et al.* (2010) argued that littering (i.e., dumping of any material into the environment whether intentionally or unintentionally) is a form of common illegal behaviour that creates unnecessary costs to society and has implications to the environment at global, regional, national and local scale. Furthermore, Law *et al.* (2010) states that litter based on land is a type of waste that can potentially pollute both the shores and the ocean waters. Due to the situation described in the paragraph above, port management (ME's) often request Transnet employees to assist in port clean-up operations; quite often ME's from the contractors and tenants would

voluntarily do the same. As those responsible for their operations in the port, ME's do not want a potential negative image that could be associated with litter in the port environment. For ME's waste is thus associated with littering and the related cost of cleaning up operations, in terms of working hours.

Some studies suggest that the presence of litter can encourage further littering (McAndrew, 1993; Huffman *et al.*, 1995; Hing and Gungut, 2012). The Integrated Waste Management Plan (IWMP) of Transnet, does not provide clear guidance in addressing litter and the awareness of the impact and cost thereof for the Port of Cape Town. It may be necessary to address the litter problem in the port in a more strategic way via the IWMP, instead of dealing with it in an ad hoc way using the port clean ups. This may be a more sustainable mechanism for the ME's to use to manage this important problem of littering in the port environment.

3.2.1.2 The NME's responses in relation to the question: Think about waste. What comes to mind?"

There were statistical significant differences within the non-managerial employees (NME's) from all the target groups regarding the question: "Think about waste. What comes to mind? ($P < 0.001$) (Table 3.2.2). The NME's responses revealed "port clean-up" as the most prevalent thought that comes to mind in all the target groups (Transnet 59.8%; Tenants 53.9%; Contractors 43.8%; WLPH's 41.1%) (Table 3.2.2; Figure 3.2.1; Figure 3.2.1a-d).

As previously explained, the Transnet National Ports Authority has an *ad hoc* cleaning programme for the Port of Cape Town, where ME's request the NME's to assist in cleaning the port environment from waste / litter. Often the contractors and tenants also participate in these operations. All the NME groups will then, in their respective areas, clean the port by picking up litter, sweeping the port roads, cleaning blocked storm water drainage systems and removing floatsam from the port waters (Appendix B1.4). Floatsam can be defined as small particles that float on water (Hoffmann *et al.*, 1993) (Appendix B1.4). This involvement of MNE's in port clean-up operations may be the reason why "port clean-up" were the most prominent thought for this group when they were asked "think of waste, what comes to mind?"

The NME's receive "goody bags" as an incentive for taking part in the port clean-up operations. However, the financial moratorium at the TNPA does not always allow these "goody bags" to be provided to the workers. This is because a financial moratorium decision is made every quarter of the year, where the management of Transnet reviews the financial status of the company. A moratorium can be active for a period of five to six months depending on the reviewed quarter where financial loss was recorded. Anti-litter campaigns such as 'Neat Streets' and 'Do the right thing' attempt to have an impact in educating and encouraging the public to improve their behaviour with regards to the disposal of waste (Hardesty *et al.* 2016; Keep Australia Beautiful, 2016; Neat Street, 2017; Willis *et al.* 2018). Despite the port clean-ups happening from time to time, the port environment becomes filled with waste repeatedly. The TNPA could consider adding an awareness component to the port clean-up operations / campaigns to increase the awareness of NME's on the various impacts of waste in the port environment.

It must be noted that since 2019 (after the data collection process was completed) the port clean-ups were outsourced to a waste service company by the TNPA. The outsourcing of the port clean-ups has led to tenants and contractors withdrawing their voluntary services in the cleaning up operations.

3.2.1.3 Comparison in responses between the ME's and NME's with regards to the question: "Think about waste. What comes to mind?"

The difference in responses between the ME's and NME's could have been influenced by the different roles that ME's and NME's play in their organizations (Table 3.2.1; Table 3.2.2; Figure 3.2.1; Figure 3.2.1a-d).

The ME's, by the nature of their organizational function, must manage. Litter may have been foremost in their thoughts when thinking of waste because litter is a problem in the port environment that needs to be managed. The reason for the NME's indicating port clean-ups as the most prominent thought when thinking of waste may be because they are the ones that must conduct port clean-up operations when waste becomes a problem in the port. The concepts of litter and port clean-ups are obviously closely related in the context of waste, linking the most prominent responses of the ME's and NME's.

Recycling (5.9 - 25.0%) and oil spill (1.0 - 13.7%) response percentages were found to be relatively low for ME's and NME's in all the target groups for the question about respondents' thoughts when they think about waste (Table 3.2.1-2; Figure 3.2.1; Figure 3.2-1a-d). The South African government strategy encourages both public and the industries to recycle (DEA, 2011). The Transnet waste management hierarchy also indicate recycling as one of the strategies to lower the waste to landfill site (Transnet SOC Ltd, 2015a). Transnet seems not to be effective in recycling in its operations, even though it is indicated in the strategy. There is no clear budget indicated for recycling, neither was recycling implemented onsite (TNPA, 2017a&b). Raising awareness about recycling would be a futile exercise when the resources are not in place to make it a reality. This is in reference for both "recycling" as far as waste is concerned and "oil spill" recycling especially from the water. As long as the budget and resources are not available to implement recycling, raising awareness may not be profitable, while there are these barriers. Godfrey *et al.* (2013) indicates that the majority of private companies in South Africa lack proper budgeting and resources for recycling which result in poor waste management. For awareness with regards to recycling to be high the TNPA must provide suitable resources (such as a budget). In the interviews conducted with the Environmental Resources and Solid Waste Management Departments of the City of Cape Town, it can be deduced that local government would like to see more awareness and practices resulting in waste being minimised, reused and recycled by both industries and the communities.

3.2.2 Understanding of all target groups as it relates to pollution

Table 3.2.3. Responses of managerial employees (ME's) from all the target groups regarding the question: Think about pollution. What comes to mind?

	Options	Group: Difference: $\chi^2 = 44.362$, df = 21, p-value <0.001							
		Contractors		Tenants		Transnet		Waste Licence Permit Holders	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
Think about pollution. What comes to mind?	Littering	12	52.2%	14	45.2%	36	39.6%	7	63.6%
	Marine waste	5	21.7%	10	32.3%	12	13.2%	6	54.5%
	Air pollution	16	69.6%	15	48.4%	35	38.5%	3	27.3%
	Oil spill	2	8.7%	13	41.9%	31	34.1%	3	27.3%
	Disease	0	0.0%	3	9.7%	6	6.6%	1	9.1%
	Climate	1	4.3%	2	6.5%	1	1.1%	1	9.1%
	Others	0	0.0%	0	0.0%	8	8.8%	0	0.0%

Table 3.2.4. Responses of non-managerial employees (NME's) from all the target groups regarding the question: Think about pollution. What comes to mind?

	Options	Group: Difference: $\chi^2 = 64.860$, df = 21, p-value <0.001							
		Contractors		Tenants		Transnet		Waste Licence Permit Holders	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
Think about pollution. What comes to mind?	Littering	25	31.6%	49	31.0%	105	29.2%	18	26.9%
	Marine waste	5	6.3%	22	13.9%	31	8.6%	7	10.4%
	Air pollution	16	20.3%	33	20.9%	58	16.2%	20	29.9%
	Oil spill	12	15.2%	29	18.4%	113	31.5%	12	17.9%
	Diseases	5	6.3%	10	6.3%	30	8.4%	3	4.5%
	Climate	8	10.1%	5	3.2%	10	2.8%	0	0.0%
	Others	8	10.1%	10	6.3%	12	3.3%	7	10.4%

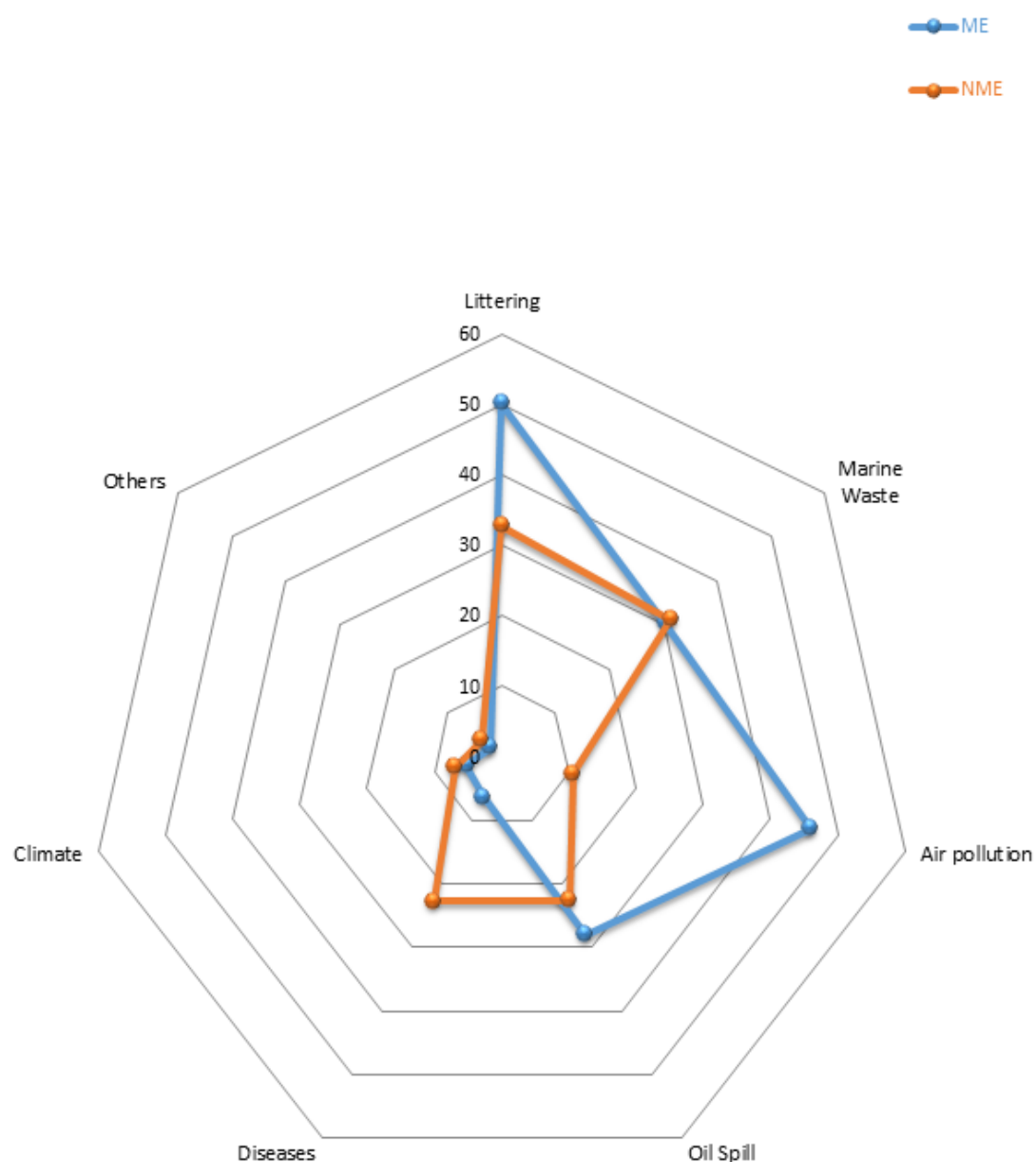


Figure: 3.2.2 An illustration of the pooled response percentage of all the target groups (ME's and NME's) regarding the question: Think about pollution, what comes to mind?

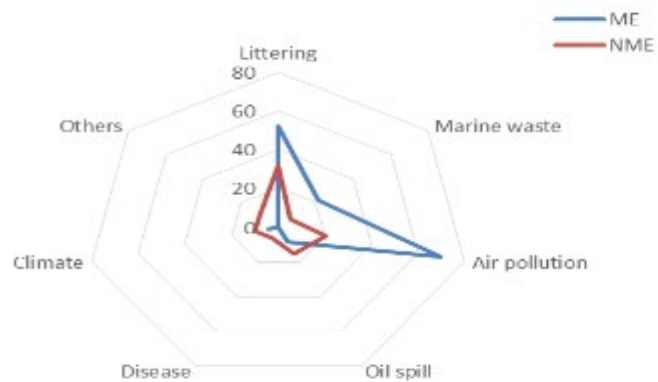


Figure 3.2.12a: An illustration of the response percentage of Contractors group (ME's and NME's) regarding the question: Think about pollution, What comes to mind?

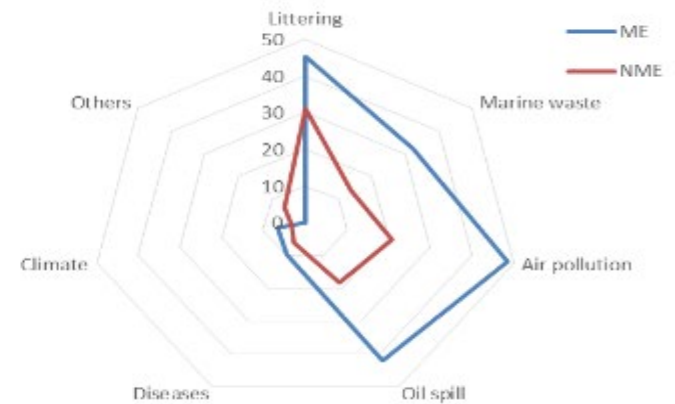


Figure 3.2.12b: An illustration of the response percentage of Tenants group (ME's and NME's) regarding the question: Think about pollution, What comes to mind?

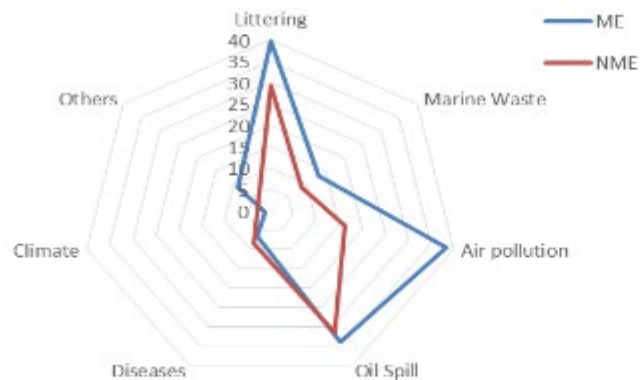


Figure 3.2.12c: An illustration of the response percentage of Transnet group (ME's and NME's) regarding the question: Think about pollution, What comes to mind?

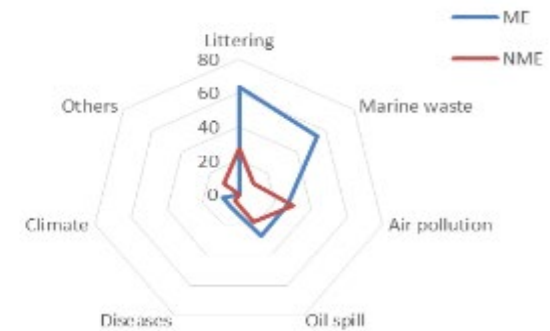


Figure 3.2.12d: An illustration of the response percentage of WLPHs group (ME's and NME's) regarding the question: Think about Pollution, What comes to mind?

3.2.2.1 The ME's response in relation to the question: "Think about pollution. What comes to mind?"

The MEs of all the target groups indicated "littering" (39.6 - 63.6%), "air pollution" (27.3 - 69.6%), "marine waste" (13.2 - 54.6 %) and "oil spill" (8.7 - 41.9%) as the most prominent responses to this question (Table 3.2.3-4; Figure 3.2.2).

There are times when the Port of Cape Town environment is not clean due to littering. The issue of littering in the port environment has been previously discussed in heading 3.2.1.1. Marine waste includes floatsam (litter and debris floating on the surface of the sea water) and waste materials that sink to the bottom of the water column. Marine waste may find access into the Port of Cape Town waters via storm water drains and the Salt River. There are six stormwater outlets in the Port of Cape Town that originate from outside the port's premises. Quite often wastewater in these storm water outlets contain all kinds of waste material that end up becoming marine waste in the port waters. ME's may find that litter and marine waste in port waters pollute the land and marine environment. Here is a close connection between waste and pollution for the ME's. They regard litter and marine waste as a waste management and pollution management problem (Also, see heading 3.2.1.1) (Appendix B2). The ME's view these port clean-ups as a way to manage the litter and marine waste problem in the port. Sivadas *et al.* (2022) suggest that without any reasonable doubt that litter is a human cause that affect nature in a negative way and even pollute the environment.

Nkwocha and Okeoma (2009) argued that failure of environmental strategies to include psychological intervention with public (in this case, workers) consultation limits the chances of success. This indicates that the workers need to be made more aware of littering and the consequences thereof in order to truly mitigate the problem. The Integrated Waste Management Plan (IWMP) of Transnet does not specifically provide guidance on how littering should be addressed in the Port of Cape Town (TNPA, 2015a & 2020a). It is therefore important for the TNPA to review its strategy to accommodate raising awareness among its workers to manage the problem more effectively.

Transnet has a pollution control team that participates in internal awareness programmes, that includes the annual National Safety Day (NSD) (TNPA, 2018b & g).

The annual NSD programme, coordinated by the SHE Department, promotes awareness in the areas of safety, health and environmental issues in the context of the Port of Cape Town. This event is usually attended by ME's and NME's of Transnet and some other port users. The pollution control team on that day will demonstrate the cleaning of both oil spill in water and on land. In this way NSD is used to make employees aware of the activities related to the pollution control team. However, the NSD does not cover "air pollution" (TNPA, 2018b & g).

Relatively speaking, "air pollution" (27.3 - 69.6%) was quite foremost in the mind of ME's of most of the target groups, with the exception of the WLPH's. Air pollution was the most prominent response for contractors and tenants (69.6% and 48.4% respectively), while Transnet and the WLPH's revealed response percentages of 38.5% and 27.2%, respectively (Table 3.3; Figure 3.2.2). In 2016, five months before the questionnaires were distributed for data collection, an incident in the Port of Cape Town caused a fire on one of the fishing vessels that were berthed at quay 703. The fire raged on for about two weeks before it was totally extinguished. The continuous fire caused considerable levels of air pollution. This incident and the subsequent air pollution may have played a role in the responses of ME's to this question. After the fire and the related air pollution issues, Transnet launched a study that investigated air pollution (uMoya-NILU, 2016a, b, c). Therefore, the fire on the fishing vessel and its consequences may have raised the awareness of air pollution, at the time of data collection.

Furthermore, other operational activities in the port may have also contributed to the responses of ME's to the question on what comes to mind when they think of pollution. These activities include grit blasting, water blasting, vessel cutting, welding, vessel spray painting and vehicle movement (such as trucks) in the port (WSP, 2013). These activities are taking place on a daily basis and may to varying degrees contribute to air pollution in and around the port grounds. These activities may not take place on windy days (TNPA, 2018c). Such activities may result in complaints from businesses and the general in the surrounding area. Such complaints may result in City of Cape Town Law Enforcement enforcing City By-laws (CCT, 2010a) and compelling Transnet to comply. For Transnet to avoid such consequences, measures are in place to regulate such activities. As mentioned, these activities may trigger air pollution and

reduce air quality (Appendix B25). Active management of activities such as grit blasting, water blasting, vessel cutting, welding, vessel spray painting and vehicle movement (such as trucks) in the port is needed to prevent negative consequences for the port authority. This may have been a contributing reason why air pollution came to mind for ME's when they were asked what comes to mind when they think of pollution. Thus, ME's must be actively aware of the risk of air pollution.

3.2.2.2 The NME's response in relation to the question: "Think about pollution. What comes to mind?"

The NME's revealed "littering" as the most prominent response to this question for contractors (31.6%) and tenants (31%). Waste licenses permit holders (WLPH's), and Transnet were the exceptions. WLPH's revealed "air pollution" (29.9%) and Transnet provided "oil spill" (31%) as the most prominent response, followed closely by "littering" in both cases (Table 3.2.3.; Table 3.2.4; Figure 3.2.2).

In general littering was the most prominent response when NME's thought about pollution. Littering in the Port of Cape Town was expressed as an ongoing challenge and was interpreted by the NME respondents as pollution. Wanjohi (2016) stated that littering is one of the visible and important environmental problems. According to Schulz *et al.* (2011) and Schulz (2013) littering is the result of human behaviour. In the Jordanian coastal region of the Gulf of Aqaba, it was found that most litter were from local land-based or near shore sources. The main local sources were beach goers, as well as the passenger and cargo ports (Abu-Hilal & Al-Najjar, 2004). In most studies litter was found as the source of pollution (Falk-Andersson, 2021; Harris *et al.*, 2021; Drægni *et al.*, 2021; Borongan & NaRanong, 2022). The NME's play an important role in ensuring that littering is cleared and collected when it becomes problematic in terms of the aesthetics of the port. That may have played an important role in the responses of NME's to this question.

The most prominent response of Transnet NME's to this question was "oil spill". This could be because Transnet has a dedicated team that deals with oil spill clean-ups; the pollution control team, as previously discussed in 3.2.1.1. In an annual National Safety Day (NSD) the pollution control team participate in conducting awareness programmes, that among others, deals with oil spills (TNPA, 2018b). During these

events oil spills are emphasized as a major pollution problem in the port. This may have contributed to the NME's responses to this question.

The reason the WHLP NME's revealed "air pollution" (29.9%) as their most prominent though on pollution, may relate to the 2016 (close to the time of the data collection) incident when a fishing vessel was on fire in the Port of Cape Town, as previously indicated in heading 3.2.2.1. The fire caused excessive smoke in the air for a few weeks over the port. This recent memory of the fire and the air pollution it caused may have been a contributing factor in the WLPN NME's preference when they thought of pollution for this question.

A study conducted by Claeson *et al.* (2013) indicated that when people are exposed to air pollution, and the study is conducted at an early stage while still exposed, the response is likely to be influenced by the exposure of that particular air pollution event. It was a similar situation in this study. It is therefore not surprising for responses of NME's to consider "air pollution" as one of the prominent responses. This simply mean that people are likely to be informed about what they are exposed to, or have been exposed to, in order to provide their view on what they understand about pollution.

According to Cisneros *et al.* (2017), air pollution is one of the aspects of daily life. In their study, which was conducted in San Joaquin Valley, California, investigating the understanding of air pollution public perception and awareness, air pollution was lacking as far as awareness is concerned. Despite this lack of air pollution in San Joaquin Valley, the local air pollution control districts made efforts in providing the residents with awareness programmes in relation to air pollution (San Joaquin Valley Air Pollution Control Districts, 2016). There is a need to be aware of the awareness strategies that are relevant to the target population. It is thus crucial for Transnet to consider the content of its awareness programmes to ensure relevance in terms of the topics covered therein.

3.2.2.3 Comparison of the responses of ME's and NME's with regards to the question: "Think about pollution. What comes to mind?"

The ME's and NME's generally revealed "littering" as the most prominent response to this question. Some years ago in South Africa, many people were not considering littering as environmental pollution (Leballo, 2012). Wanjohi (2016) stipulated that littering is one of the most visible and important environmental problems. Littering is the result of human behaviour (Huyser *et al.*, 2021; Schulz, 2013). Nkwocha and Okeoma (2009) argued that failure for a strategy to include psychological intervention with consultation from the public, the chances of success are very limited, if not at all a failure. According to Tahulela (2017) there has been local government (South Africa) interventions regarding littering awareness programmes for the public. Generally, littering awareness is so high because it is a visible problem in plain sight.

The other prominent response given by the target groups (ME's and NME's) was air pollution. The response percentage ranged from 16.2 - 69.6%. The ME's response percentage is generally higher than the NME's. Various activities in the Port of Cape Town can trigger air pollution. Most of the time the ME's would conduct air pollution monitoring programmes. This expose them to information that raise their awareness of the surrounding conditions and the mitigation measures to be applied in order to obtain an air pollution license permit from the local government (DEA&DP, 2014). Because ME's are more involved in air pollution matters, it might be a contributing factor for the NME's low response. The drafting of EMP's more often are the responsibilities of the ME's. These documents are signed off by the ME's which become aware of the content that has elements of air pollution in the document and its requirements for implementation compared to the NME's who may not have the privilege of being made aware of the documents and their responsibility for execution may be disadvantaged at the process.

3.2.3. The types of environmental awareness programmes offered by ME's to NME's

Table 3.2.5: Responses of managerial employees (ME's) from all the target groups regarding environmental awareness programmes offered to non-managerial employees (NME's).

	Options	Group: Difference: $\chi^2 = 27.970$, df = 15, p-value <0.05							
		Contractors		Tenants		Transnet		Waste Licence Permit Holders	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
What type of environmental awareness programmes did you provide to your employees?		25	100.00%	27	96.40%	39	76.50%	9	81.80%
	Waste	19	76.00%	21	75.00%	36	70.60%	6	54.50%
	Pollution	16	64.00%	17	60.70%	29	56.90%	1	9.10%
	Air	18	72.00%	19	67.90%	31	60.80%	5	45.50%
	Water	22	88.0%	23	82.10%	39	76.50%	9	81.80%
	Oil								

Table 3.2.6: Responses of non-managerial employees (NME's) from all the target groups regarding environmental awareness programmes offered to them.

	Options	Group: Difference: $\chi^2 = 35.039$, df = 15, p-value <0.05							
		Contractors		Tenants		Transnet		Waste Licence Permit Holders	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
What type of environmental awareness programmes did you receive from your company?		56	77.80%	71	71.70%	92	59.40%	55	83.30%
	Waste	48	66.70%	58	58.60%	96	61.90%	41	62.10%
	Pollution	35	48.60%	45	45.50%	53	34.20%	31	47.00%
	Air	44	61.10%	56	56.60%	76	49.00%	36	54.50%
	Water	51	70.80%	65	65.70%	95	61.30%	53	80.30%
	Oil								

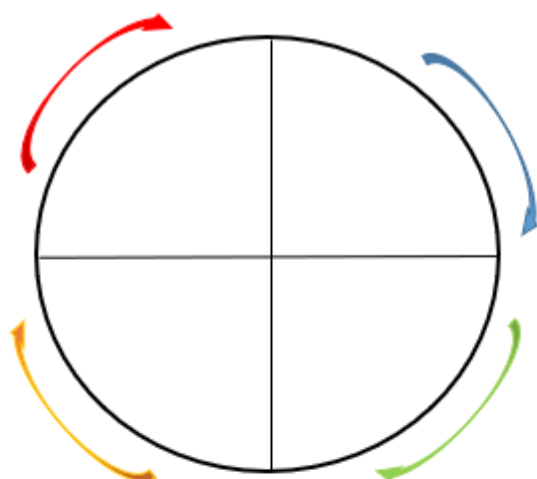


Figure 3.2.3: An illustration of the distribution of the responses of ME's of all the target groups regarding waste environmental awareness programmes offered to NME's.

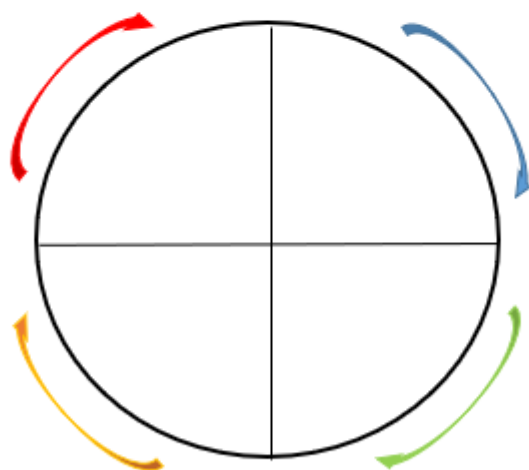


Figure 3.2.4: An illustration of the distribution of the responses of NME's of all the target groups regarding waste environmental awareness programmes offered to them

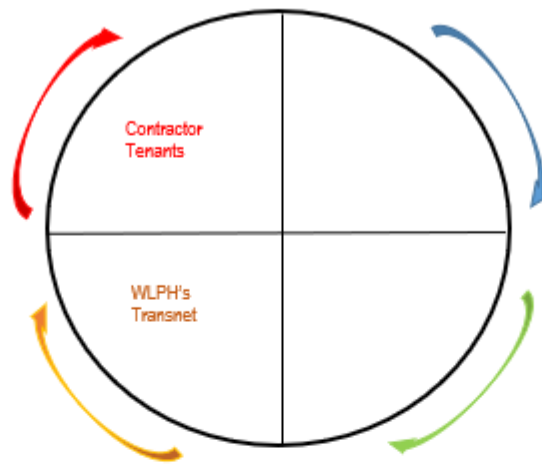


Figure 3.2.5: An illustration of the distribution of the responses of ME's of all the target groups of regarding pollution environmental awareness programmes offered to NME's.

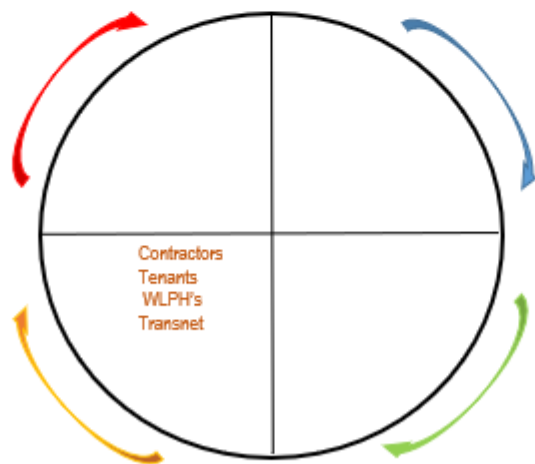


Figure 3.2.6: An illustration of the distribution of the responses of NME's of all the target groups regarding pollution environmental awareness programmes offered to them.



Figure 3.2.7: An illustration of the distribution of responses of ME's of all the target groups regarding air environmental awareness programmes offered to NME's.

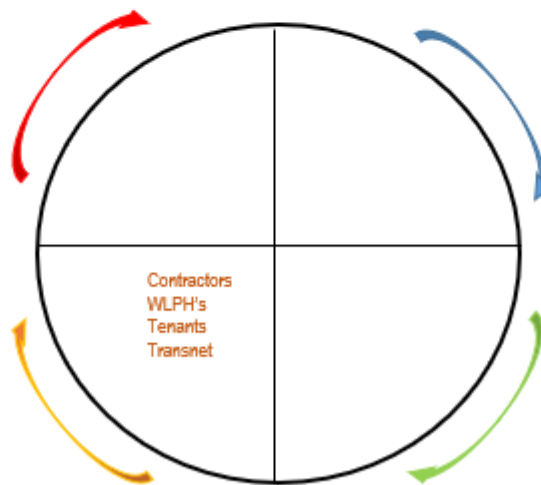


Figure 3.2.8: An illustration of the distribution of responses of NME's of all the target groups regarding air environmental awareness programmes offered to them.

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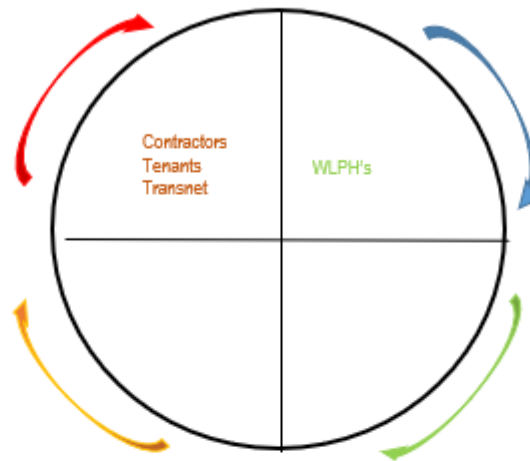


Figure 3.2.9: An illustration of the distribution of responses of ME's of all the target groups regarding water environmental awareness programmes offered to NME's

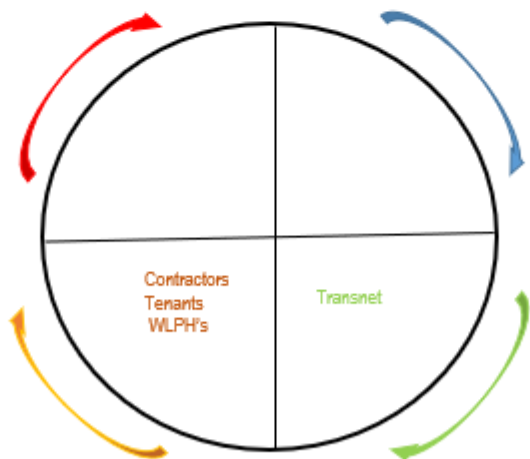


Figure 3.2.10: An illustration of the distribution of responses of NME's of all the target groups regarding water environmental awareness programmes offered to them.

3.2.4 Contractor responses (ME's and NME's) concerning the types of environmental awareness programmes

There were statistical significant differences within the managerial employees (ME's) and the non-managerial employees (NME's) in terms of the responses regarding the types of environmental awareness programmes ($P < 0.05$) (Table 3.2.5; Table 3.2.6).

The target groups and awareness options were compared with each other. The ME's of contractors had response percentages ranging from 64 - 100%, while NME responses ranged from 48.6 – 77.8% (Table 3.2.5; Table 3.2.6). It is expected from any contractor that performs their work within the port premises to hand in a Safety, Health and Environment Plan (SHEP) to the TNPA Safety Health and Environment (SHE) department (Appendix B3; Transnet SOC Ltd, 2017a). This SHEP file is evaluated for compliance purposes as per legal requirements by a Risk Specialist (RS) at the TNPA SHE department. In the submissions and evaluation of the SHEP file, the RS evaluate the competency of the individuals from the contractors that are expected to perform their duties in the port (Appendix B4). According to the Construction Regulations of 2003, Section 4, Subsection 4, stipulates that “no client (in this case TNPA) shall appoint a principal contractor to perform construction work, unless the client is reasonably satisfied that the principal contractor that he or she intends to appoint has necessary competencies and the resources to carry out the work safely” (Republic of South Africa, 2003). The contractor is obliged to present a SHEP file that complies with the Construction Regulations of 2003, amongst others, in matters that are related to awareness of the employees in respect to safety, health and environmental issues.

The RS of the TNPA conducts a Safety, Health and Environmental (SHE) induction programme to all the contractors appointed to do work for TNPA. In this SHE induction programme aspects of environmental awareness are also included (Transnet SOC Ltd, 2019; TNPA, 2015a). The International Maritime Organisation developed relevant environmental awareness programmes for the maritime sector, especially for working in the port environment (IMO, 2016). The Port of Cape Town incorporates the IMO (2016) environmental awareness programme into its own awareness processes. For ease of reference, the attendees of this induction programme also receive awareness

brochures that deals with SHE matters (Appendix B5). Furthermore, all necessary documents related to the SHEP file should always be onsite for DOL inspection purposes. The offered awareness programmes and attendance registers should also be kept on record as part of the SHEP files (Appendix B6).

From here the discussion focuses specifically on the responses of the ME's and NME's in terms of the different types / components (waste, oil spill, air, pollution and water) of environmental awareness programmes.

3.2.4.1 Waste and oil spill related awareness of contractors

"Waste" and "oil spill" awareness programmes received the highest response percentages from ME's and NME's. The ME's provided a response percentage of 100% for "waste", while "oil spill" received a response percentage of 88% (Table 3.2.5). The NME's provided a response percentage of 77.8% for "waste", while "oil spill" received a response percentage of 70.8% (Table 3.2.6).

"Waste" awareness programmes are provided by contractors to their employees, especially where the risk register identifies waste as a risk in the operations (TPT, 2012; DCD Dorbyl Marine Cape Town (Pty) Ltd, 2016). According to Transnet SOC Ltd (2017a) contractor procedures require contractor management to provide a Safety Health and Environmental Plan (SHEP) file to the TNPA. This file should indicate the awareness programmes that were offered to the employees (NME's) that will be conducting work on the port premises. An attendance registers of the employees (NME's) attending the awareness programmes should also be in the files. It is the duty of contractor ME's to ensure that this returnable document is part of the SHEP file. Failure to present these documents may lead to the TNPA RS to disapprove the SHEP file. Such contractors will thus not be allowed to work in the port premises. When all the necessary returnable documents are provided and the SHEP file is approved then the contractor will be invited for a site visit, briefing and walkabout with an induction programme that includes an awareness component from the TNPA.

Daily, ME's conduct short briefing meetings before operations for the day commence. The purpose, amongst others, is to raise awareness about particular SHE matters, such as "waste" and "oil spill" concerns. These meetings are called green area

meetings. During these green area meetings NME's are made aware of the "waste" to be cleaned at the end of the shift. One of the NME representatives is required to conduct weekly SHE housekeeping inspections to ensure that "waste" and "oil spill" issues do not become problematic. Should it happen in the inspection that housekeeping is found to be poor with unnecessary "waste" and "oil spills", then action needs to be taken. The required action to remove "waste" and "oil spills" will be signed off by the supervisor (one of the ME's) when completed. Based on the findings of the inspection, appropriate awareness programmes should be implemented. An inspection report should also be signed off by the relevant ME or supervisor (Appendix B7). SHE housekeeping inspections are used as a tool to make the employees more aware of "waste" and "oil spill" problems and how it should be dealt with. These interventions may have also contributed to the high response percentages for "waste" and "oil spill". It is possible that awareness interventions such as green area meetings, SHE housekeeping inspections and the operational requirements of handling "waste" and "oil spills" influenced the response percentages.

3.2.4.2 Pollution and water related awareness of contractors

There were similar response percentages for "pollution" and "water" from ME's and NME's. The ME response percentages for "pollution" and "water" were 76.0% and 72.0%, respectively. The response percentages for NME's for "pollution" and "water" were 66.7% and 61.1%, respectively (Table 3.2.5; Table 3.2.6).

"Pollution" and "water" environmental awareness programmes are conducted for the contractor employees by the SHE specialist of the contractors. Before any operations of the contractors take place (mostly in the dry docks) ME's of Transnet take contractor representatives on a site briefing session and walk-about where awareness is raised of specific matters. During these site briefings and walkabouts both parties visit the operational areas where the work will be done. Awareness regarding particular matters are raised during this event. Awareness is not limited to environmental issues in relations to "pollution" and "water" but also issues such as infrastructure and machinery, amongst others. These site briefings and walkabouts assist in identifying any potential "pollution" and "water" contamination problems that may arise during the work done by the contractors. Such problems may, for example, arise when the dry dock is flooded or unflooded. In some instances, contractors leave the operational site

behind with “pollution” and “water” contamination issues. The intention of these site briefings and walkabouts is to avoid any “pollution” and “water” contamination issues after the work is done by the contractors.

The United States Environmental Protection Agency (USEPA) describes some of the activities that may result in pollution that may affect water quality in dry docks. Examples include, mechanical grinding, paint chips, rust, dust, paint removal and abrasive blasting. The EPA (2005), amongst others, recommends sweeping of the dry dock area to prevent “pollution” and “water” contamination issues. It should be noted that in countries where the required cleaning technology is not available, sweeping of the larger dry dock areas may be expensive, since it would be highly labour intensive and may take a significant amount of work hours (NASSCO 1995; EPA, 2005). The practice applied by the Port of Cape Town is similar to that recommended by the EPA (2005) but without using technology. The dry docks are physically swept by NME’s. This activity and the associated awareness of the effect of the sweeping could have had a positive influence on the response percentages for “pollution” and “water” since the NME’s are fully aware why they fulfil this function.

The CSIR monitors port water quality twice a year in winter and summer on behalf of the Port of Cape Town (CSIR, 2016a). At some sampling stations during the 2016 survey the water quality was classified as fair, while in the winter of 2015, during the previous survey, was at mostly good and excellent. In the 2016 summer survey water quality was classified as fair to good, but in some sampling stations it was occasionally excellent. However, the water quality at some stations was classified as poor. The most significantly impaired water quality was in the Alfred Basin, where metal concentrations were higher than in other parts of the port. In the Duncan Dock nutrient concentrations and faecal indicator bacteria counts were found to be high (CSIR, 2016a). The CSIR (2018) survey found that surface water quality across most of the Port of Cape Town in the winter of 2017 and the summer of 2018 could be classified as good or excellent. Nonetheless, in the Duncan Dock the water quality during the winter survey was found to be fair. Similarly, water quality during the summer survey in the Victoria and Alfred Marina, part of Duncan Dock, and the Entrance Basin were classified as fair as well (CSIR, 2018). The water quality index (CSIR, 2018) suggests an improvement compared to the previous investigation by the CSIR (2016a). According to Corcoran *et al.* (2010) collaboration and sharing of information is crucial

for raising awareness. This is important for continuous improvement of water quality (Corcoran *et al.*, 2010). Transnet shared the water quality results with contractors in different platforms and as well as part of environmental awareness programmes especially in the briefing session for dredging activities (TPT, 2012; CSIR, 2018; Appendix B10). This practice of sharing information and raising awareness may have contributed to the improved water quality in the port between 2016 and 2018, and a greater awareness of “pollution” and “water” issues in the port environment.

3.2.4.3 Air pollution related awareness of contractors

ME’s and NME’s provided the lowest response percentages (64.0% and 48.6%, respectively) for “air pollution” (Table 3.2.5; Table 3.2.6).

Air pollution awareness programmes are provided to the ME’s and NME’s of the contractors that relate to activities in the dry docks such as cutting of vessels and grit blasting, amongst others. The majority of ship repair activities in the dry docks trigger air pollution in some way or form. Air pollution, as referred to in this study, does not necessarily equate excessive air pollution that may be continuous. Air pollution in this case may be small scale and in limited areas.

In the dry docks the contractors may from time to time be engaged in cutting of vessels (TNPA, 2018c; Appendix B25). The fumes that are generated in this process are emitted for a relatively short period of time. Normally the air clears up soon after this activity stops. The nearest air quality monitoring station from the City of Cape Town are approximately one kilometre away from where vessel cutting takes place in the port (Synchrolift dry dock). This is too far away from the dry dock to be used to measure the contribution of port activities to air pollution. During data collection for this study, the TNPA did not have any air quality monitoring station or even a portable device to measure air pollution in the dry docks. As long as air emissions from maritime activities are not monitored, the need for more effective air pollution management will not be clear (Mwase *et al.*, 2020).

In 2016 the TNPA hired a private consultancy (uMoya-NILU) to conduct a study to compile an emission inventory for the Port of Cape Town. They found that the sources of air emissions were harbour craft, ocean-going vessels, and motor vehicles. The

emission inventory included, SO₂, NO_x, CO, VOC, PM₁₀ and PM_{2.5}. The ocean-going vessels exceeded the contribution of all other sources. uMoya-NILU (2016a & b) revealed that air pollution in the port environment was a problem. According to the Occupational Health and Safety Act (no. 85 of 1993), “any person who enters workplace premises must be made aware of the risk of such an environment and necessary training and awareness is required for such an individual” (Republic of South Africa, 1993). Apart from the data generated by the uMoya-NILU investigations, it was also meant to create an awareness of air pollution as a potential environmental problem in the port. However, the relatively low response percentages for “air pollution” relative to other responses gives the impression that air pollution is not high on the awareness agenda in the port environment. Maybe this is a true reflection of the risks air pollution is posing in the port relative to other potential environmental problems. Nonetheless, it is important to comply with the Occupational Health and Safety Act’s (Republic of South Africa, 1993) requirements, as pointed out earlier. It is therefore recommended that Transnet should share the air pollution reports with contractors to raise awareness and create policies and strategies that will address any potential air pollution issues.

3.2.5 Tenant responses (ME’s and NME’s) concerning the types of environmental awareness programmes

There were statistical significant differences within the managerial employees (ME’s) and the non-managerial employees (NME’s) in terms of the responses regarding the types of environmental awareness programmes ($P < 0.05$) (Table 3.2.5; Table 3.2.6). The tenants’ response percentages were generally found to be the second highest of all the target groups (60.7% to 96.4% for ME’s, and 45.5 % to 71.7% for NME’s) (Table 3.2.5; Table 3.2.6).

The National Ports Act (no. 12 of 2005) (hereafter “the Act”) states the TNPA functions in Section 11(1) of the Act as: (i) “Own, manage, control and administer ports to ensure their function, in so doing TNPA must administer (i) Section 11(1)(c) – control land use within ports with the power to lease land under such conditions as the authority may determine; (ii) Section 11(1) (f) – maintain the sustainability of the ports and their surroundings, (iii) Section 11(1)(g) – regulate and control pollution and protection of the environment and enhance safety and security”. Furthermore, Section 56(2) of the

Act “gives powers to the Authority (in this case TNPA) to monitor and annually review performance standard specified in the agreement and the competency of the employees in those operations” (Republic of South Africa, 2005). At the time of data collection, there were 121 tenants in the Port of Cape Town (Tenant Sampling procedure heading 2.9.3).

The TNPA SHEQ department plays an oversight role in terms of tenants by conducting annual audits and SHE induction awareness programmes and providing related brochures (Appendix B5). There are two Environmental Specialist (ES's) in the SHEQ department. Between these two ES's, one conducts annual audits of the tenants, while the other ES conducts audits of the Waste Licence Permit Holders. Besides these oversight audits, both ES's have other responsibilities in the port.

Among other requirements, the ES verify the environmental awareness programmes provided to the employees of the tenants. The tenants are obliged to provide evidence of awareness programmes offered to their employees during the audits. The evidence of awareness programmes is accompanied by the attendance register to these programmes. In the event where the awareness programme or records thereof are not available during the audits by the ES, a notice of non-conformance is issued to the tenant (Appendix B11). The audit schedule and reports indicate that not all the tenants are audited by the ES due to inadequate time and a shortage of staff in the TNPA SHEQ department. However, despite this challenge the response percentages suggest that environmental awareness programmes are offered to a reasonable degree to the employees of tenants.

From here the discussion focusses specifically on the responses of the ME's and NME's in terms of the different types / components (waste, oil spills, pollution, water and air) of environmental awareness programmes.

3.2.5.1 Waste and oil spill related awareness of tenants

The ME's gave the highest response percentage for “waste” (96.40%), while the NME's provided the highest response percentage for “oil spill” (71.70%) (Table 3.2.5; Table 3.2.6). These results from the tenants indicate a similar tendency as for contractors (heading 3.2.4.1) (Table 3.2.5; Table 3.2.6).

In both contractors and tenants, the ME's gave the highest response percentage for "waste", while the NME's gave the highest response percentage to "oil spill". The contractors and tenants clearly both prioritise "waste" and "oil spill" in terms of awareness programmes. This could be due to the types of activities contractors and tenants undertake in the port, and the priorities of the TNPA. According to Section 56 of the National Ports Act (no. 12 of 2005), tenants must sign lease agreements with the TNPA. These lease agreements require, amongst other matters, the tenants to submit environmental management plans. Tenants should also demonstrate how they will manage waste and the mechanisms they will use to dispose of waste at landfill sites (Republic of South Africa, 2005; DEA, 2014a). The environmental management plan must demonstrate how waste will be minimised. In certain cases, waste is collected by the TNPA-contracted WLPH's as a lease agreement service to tenants (TNPA, 2015a & 2020a). Only general waste is collected by the Transnet contracted WLPH's from tenants. Other types of waste, such as hazardous waste, that require special measures for disposal is the responsibility of the tenant. They should make the necessary arrangements with WLPH's that operate in the port. The different types of waste (general and hazardous waste) should be segregated by the tenants for collection by the different service providers. Due to these processes, the ME's of tenants ensure that their NME's are offered "waste" related awareness programmes. Records of these awareness programmes are filed by the tenants for audit purposes. It is thus not surprising that high responses for "waste" related awareness programmes was recorded for tenant ME's.

The NME's gave the highest response percentage of 71.70% for "oil spill" awareness programmes. Since it is the responsibility of the tenant employer to provide awareness to their employees (Republic of South Africa, 1993), the ME's of tenants provide "oil spill" and related awareness to their NME's by means of sharing the awareness programmes from the formal training programmes with certification as explained in detail in chapter 4 under heading 4.2.2.1.

In terms of Section 62 of the National Ports Act (no. 12 of 2005), the duties that the tenants must comply with, among others is to be compliant to environmental laws and regulations. It is one of the obligations of tenants to inform the TNPA within 24 hours

of any occurrence or discovery of: - (i) “any spillage or pollution that may have an impact on the environment”; the authority will insist on compliance with all the requirements by existing tenants and will not hesitate to take necessary steps to suspend or cancel a licence in respect of serious or repeated transgressions (Republic of South Africa, 2005). This requirement of Section 62 is a contributing factor in keeping tenants accountable towards environmental protection. This helps to explain why “oil spill” awareness programmes for their NME’s have such high priority for tenants, as reflected in the response percentages.

3.2.5.2 Pollution and water related awareness of tenants

The ME’s response percentage for “pollution” related awareness was 75.0%, while that for “water” related awareness was 67.9%. The NME’s response percentage for “pollution” was 58.6%, while that for “water” was 56.6% (Table 3.2.5; Table 3.2.6).

The tenants use toolbox talk sessions for “water” and “pollution” awareness programmes. The toolbox talk is a tool that has been found to be effective in the port environment in ensuring that information is shared among the employees concerning various work conditions and requirements (Gross, 2015; Babu and Devi, 2020). Additionally, the notice boards are also used to create awareness regarding “pollution” and “water” issues in the port. The tenants also promote awareness of different environmental themes by means of the Department of Environmental Affairs (DEA) awareness calendar. These awareness days or weeks on the DEA calendar is meant to encourage individuals and organisations to take responsibility and become an agent of change to support sustainable and equitable development. For example, these events include, the World Environmental Day (WED), World Oceans Day (WOD), International Coastal Clean-up Day (ICCU) (Republic of South Africa, 2016; Haward, 2018; Van Rensburg *et al.*, 2020).

In terms of Section 62(5) of the National Ports Act (no. 12 of 2005), it is the responsibility of the tenant to report any occurrence or discovery to the authority (in this case Transnet) of any pollution that may be detrimental to the environment. Failure to comply with the requirements of this Section may result in negative consequences for the tenant involved (Republic of South Africa, 2005). The submission of EMP’s by the tenants to Transnet must also indicate the management of “water” and “pollution”

issues with evidence of awareness provided to the employees. Furthermore, in terms of Section 63(1) of the National Ports Act (no 12 of 2005) the Transnet may conduct routine inspections at any given time and may request any documentation (Republic of South Africa, 2005). Annual audits are conducted by the ES of TNPA to verify the level of compliance in terms of “water” and “pollution” awareness programmes as well as the implementation of those programmes as per the EMP submissions. Due to the above-mentioned requirements that are in place for the effective management of the leased properties within the port, the tenants ME’s normally comply in the provision of “water” and “pollution” awareness programmes to their NME’s.

3.2.5.3 Air pollution related awareness of tenants

“Air pollution” related awareness programmes received the lowest response percentages from tenant ME’s and NME’s, compared to other types of awareness programmes (45.5 to 60.7%) (Table 3.2.5; Table 3.2.6).

At the time of data collection, there were 18 tenants that operated listed activities (uMoya-NILU, 2016c) in the Port of Cape Town. A listed activity in terms of the National Environmental Management: Air Quality Act (no. 39 of 2004) (Republic of South Africa, 2004), category 2, sub-category 2.4, is the storage and handling of petroleum products at facilities with a storage capacity of more 1 000 m³ (DEA, 2013). These listed activities are all liquid bulk activities, mainly associated with the storage and handling of petrochemical products (Sub-Category 2.41), except for the Cape Town Coal Terminal, where coal is stored and handled (Sub-Category 5.11).

In an investigation conducted by uMoya-NILU (2016c) the following challenges as far as air pollution is concerned in the Port of Cape Town were found: (i) the tenants operating listed activities do not report emissions to TNPA; (ii) the emissions inventory for listed activities in the port was also incomplete; (iii) the tenants in the bulk fuel storage terminal monitor volatile organic compounds (VOC) on their respective fence lines in terms of their air emissions licences (AEL’s), however, the monitoring data from the tenants are not reported to TNPA; (iv) ambient air quality monitoring was not done by TNPA, resulting in an inability to proactively manage air quality; (v) other tenants were not compliant as far as air pollution requirements are concerned, and; (vi) TNPA could not track their tenants’ compliance of the NEM: AQA (National

Environmental Management: Air Quality Act). There was no information with regards to the tenants' vehicle emission levels.

A tenant assessment report compiled by the provincial government, found that tenant mitigation measures for fugitive emissions were in place by means of the use of vacuum / pressure breaks. In terms of other controls, environmental management procedures for filling and offloading event emissions, were limited. The requirements of air emissions licence conditions were met in terms of monitoring (DEA&DP, 2014). To a degree it is concerning that "air pollution" related awareness programmes is partially addressed by tenants, as evident in the relatively low response percentages from their ME's and NME's. Not all the tenants comply with air pollution requirements as per legislation. It seems as if Transnet, as the landlord, is not doing enough in following up with tenant's implementation of EMPs, except when doing audits once a year. The competent authority (in this case the DEA&DP) should verify if the submitted documents from industries (in this case tenants) comply with their submissions. It also appears as if the authority that issues the air permits do not make regular inspections to tenants if the conditions of air emissions licences are adhered to, of which awareness for competent employees is one of the criteria to be verified based on the submissions to the competent authority. The records are filed as evidence, in terms of the EMP requirements. In the annual audit reports of the TNPA with regards to tenants for 2018 and 2019, no regular inspection records of audits conducted by the authority were found, especially for air pollution (TNPA, 2018b; 2019b).

3.2.6 Transnet National Ports Authority responses (ME's & NME's) concerning the types of environmental awareness programmes

There were statistical significant differences within the managerial employees (ME's) and the non-managerial employees (NME's) in terms of the responses regarding the types of environmental awareness programmes ($P < 0.05$) (Table 3.2.5 & 3.2.6). Generally, Transnet ranked third in terms of response percentages (56.90 to 76.50% for ME's and 34.20 to 61.90% for NME's) compared to the other target groups (Table 3.2.5; Table 3.2.6).

In recent years Transnet has implemented a so-called Market Demand Strategy. This strategy is to achieve particular company objectives and financial targets. This strategy was implemented in different phases over several years. In August 2014 Transnet top management realised that the financial target for that financial year was likely not to be achieved. Consequently, they introduced cost savings measures. Part of the measures included a financial moratorium (Appendix B12.1). Initially the moratorium was set as a short-term control recovery strategy. A communication about this initiative was sent to the entire Transnet workforce in its various divisions. The following were stated in the moratorium document of 2014 regarding cost savings. Section 6.1 on professional fees stated that: (i) "no further external consultants shall be appointed for the remainder of the financial year as it relates to non-operational expenditure" (Appendix B12.2). A similar moratorium process was repeated in 2015, even with stricter conditions than in the previous year. The conditions stated that "each department is required to evaluate the use of all external consultants with a view to terminate their services where internal resources exist" (Appendix B12.3). The moratorium of 2015 did not indicate an end date but rather stated "until further notice". From 2016 to 2018 the moratorium continued as a means of saving costs (Appendix B12.4). In all of this it should be taken into consideration that the TNPA has a training department that only administers training but does not offer environmental awareness programmes themselves. TNPA is relying on external consultants for environmental research projects and the roll out of environmental awareness programmes. The two ES's, due to pressures of other work-related activities, have not been able to focus on environmental awareness programmes for the Port of Cape Town (TIA, 2014).

The freeze in the utilisation of external consultants, amongst others, to facilitate environmental awareness programmes, has implications. At national and international level there has been many changes taking place concerning environmental systems and legislation. The change in environmental management system (EMS) from 14001:2004 to a new 14001:2015 requires the organisation to make individuals aware and to understand the requirements of the new system. At national level the Waste Act (no. 59 of 2008), as far as waste and pollution is concerned, requires individuals to be aware of certain matters, especially those who handle waste. The port must be operated and maintained in accordance with the requirements of the ISO 14001:2015 EMS. This EMS is an important tool to use to ensure that the port systematically monitors and identifies areas where possible environmental risks occur. A fundamental part of the EMS is addressing these risks through mitigation measures that will reduce or eliminate the impacts continuously and, in the process, protect the environment. The process requires competency of the individuals who are responsible for the implementation of the EMS (Delmas, 2000; Emilsson & Hjelm, 2002). Furthermore, this EMS also requires regular internal audits against the requirements of the ISO 14001 system, as well as the assessment of compliance to applicable legislations. Many Scholars agreed that ISO 14001 is a standard particularly for environmental management systems, which is to be implemented in any business. This system is implemented with an intention to reduce the environmental footprint of a business. In so doing, to decrease the pollution and waste a business produce (Psomas, 2011; Bravi *et al.*, 2020; Muktiono & Soediantono, 2022).

The objectives of the Waste Act (no. 59 of 2008), amongst others, is to protect the environment by providing reasonable measures for: (i) “avoiding and minimising the generation of waste; (ii) preventing pollution and ecological degradation; (iii) promoting and ensuring the effective delivery of waste services; (iv) remediating land where contamination presents or may present a significant risk of harm to health or the environment” (Republic of South Africa, 2008a). Compliance from the side of TNPA to legislative and environmental management system requirements consequently becomes a priority. For these tools to work appropriately awareness of key personnel in an organisation like the TNPA becomes crucial so that they can rollout the awareness programme to the rest of the employees in ISO systems and in legal requirements.

Transnet has an integrated policy on safety, health, environment and quality (SHEQ) (Appendix B13). The Safety, Health and Environment (SHE) Department of the TNPA is the custodian of this policy. This policy indicates that all employees should have equal opportunities for awareness, training and development. However, the financial moratorium contradicts the intention of the SHEQ policy. Furthermore, the company has embarked on a new holistic Transnet Integrated Management Approach (TIMA) (Transnet SOC Ltd, 2017c; Appendix B14). In order to effectively implement TIMA, awareness programmes should include safety, health and environmental aspects. However, in heading 3.2.1.2, it was discussed in detail that the moratorium is seasonal, it depends on the monetary loss of a certain quarter of the year. Again, the financial moratorium is hindering TIMA from being effectively implemented because the required awareness cannot take place fully as it was supposed to be. This also had a negative effect on the awareness programme in order to save costs.

From here the discussion focuses specifically on the responses of the ME's and NME's in terms of the different types / components (waste, pollution, air, water, and oil spill) of environmental awareness programmes).

3.2.6.1 Waste and oil spill related awareness of Transnet

The ME's response percentage regarding "waste" and "oil spill" environmental awareness programmes were both 76.5%. However, the NME's response percentages regarding "waste" and "oil spill" awareness programmes were 59.4% and 61.3%, respectively (Table 3.2.5; Table 3.2.6; Figure 3.2.1; Figure 3.2.9).

The environmental service for the entire port is shared among the two ES's located in the SHE Department. One of them deals with waste matters in the port. As explained earlier in this chapter, due to work pressure on the ES responsible for waste matters this person is often unable to effectively deal with waste related awareness because other matters of responsibility must also be dealt with (TIA, 2014). This situation may contribute to an unideal situation with regards to the offering of different types of environmental awareness programmes by Transnet.

According to Section 74 of the National Ports Act (no.12 of 2005) the Harbour Master's office is responsible for waste management, especially in the vessels that report to the

port (Republic of South Africa, 2005). The position of the Pollution Control Officer (PCO) is in the structure of the Harbour Master Department. Consequently, awareness programmes that deal with waste and the management thereof is supposed to be offered from the Harbour Master Department. However, the position of the PCO has been vacant for several years. The Port of Cape Town has an approved Integrated Waste Management Plan (IWMP). This plan stipulates that waste management is part of the function of the PCO (TNPA, 2015a & 2020a). The Transnet SHEQ policy requires all its employees to be aware as far as SHE is concerned (Transnet SOC Ltd, 2020). This policy further states that Transnet will provide the resources where necessary to ensure that the operations are conducted in a safe way, while being compliant to all the legal requirements. Due to the resources being lacking, the roles and responsibilities cannot necessarily be effectively fulfilled. Also, the waste awareness programmes that is meant to be rolled out to the NME's is compromised. This explains the relatively low "waste" response percentage (59.4%) recorded for the NME's of Transnet, compared to other target groups.

The ME's (76.5%) and NME's (61.30%) response percentages for "oil spill" awareness programmes, are higher than response percentages recorded for other awareness programmes from the Transnet target group (Table 3.2.5; Table 3.2.6). The Port of Cape Town has an oil spill contingency plan (TNPA, 2019a). The Harbour Master Department is responsible for the improvement and updating of this plan. Furthermore, it is the responsibility of this department to ensure that Transnet's state of readiness to appropriately manage oil spill incidents within the port is maintained. The Pollution Control Officer (PCO) is meant to be responsible for ensuring that oil spill awareness is offered to all those individuals who are involved in carrying out the oil spill contingency plan. However, as previously pointed out the PCO position has been vacant for a few years already. In spite of this it, Transnet still ensures that exercises and simulations are carrying out to prepare for possible oil spill incidences (TNPA, 2014c). When there are oil spill incidents in the port, it must be reported to both South African Maritime Safety Authority (SAMSA) and the Department of Environmental Affairs (DEA) (SAMSA, 2007). In terms of Article 8 and Protocol I of MARPOL 73/78, which establishes the reporting requirements for pollution incidents, the protocol indicates that the reports should contain as much information as possible concerning oil spill management (MARPOL, 1973). It is therefore not surprising that the response

percentages ranged from 76.50 to 61.30 % for Transnet ME's and NME's since awareness in the form of exercises and simulations are carried out. This is so because the risk of oil spills taking place is a significant threat in the port environment (TNPA, 2019a). Therefore, despite a lack of a PCO, Transnet is still relatively effective in raising awareness regarding oil spill hazards.

3.2.6.2 Pollution and water related awareness of Transnet

The ME's response percentage for "pollution" related awareness was 70.6%, while that for "water" related awareness was 60.8%. The NME's response percentage for "pollution" related awareness was 61.9%, while their response percentage for "water" related awareness was 49.0% (Table 4.2.5; Table 4.2.6).

The integrated management system (IMS) compliance policy states that the leadership of Transnet acknowledges its obligation to provide and maintain a working environment to the employees, public, assets and the natural environment that is not harmful. The philosophy is based on the principle of the prevention of occurrences of incidents and accountability for those occurrences. This philosophy applies to all employees of Transnet (Transnet SOC Ltd, 2020). It is an expectation that all employees should have knowledge, experience and awareness that are specific to their duties which they have been appointed to supervise, to carry out and / or control (TNPA, 2015b&d). The policy objective requires the prevention or at least the reduction of environmental pollution occurrences. This can be achieved by the provision of appropriate environmental awareness programmes, among other preventative measures (Transnet SOC Ltd, 2020).

According to the Transnet Capital Project (TCP) (2018) the approved standard environmental management plan for the Port of Cape Town indicates that environmental awareness programmes are targeted at managerial and non-managerial employees. The environmental awareness programmes are formulated for these levels and should comprise of the following: (i) a record of all names, positions and duties of staff for awareness, as well as (ii) a framework for awareness programmes. Such programmes should set out the awareness requirements which need to be catered for, prior to the commencement of any work within the port. Additionally, should there be any environmental aspects that are unclear to the

employees, the Environmental Officer (EO) from the TNPA may be requested to provide additional awareness on site (TCP, 2018). Due to a lack of human resources (as reported earlier) at the Port of Cape Town, the provision of environmental awareness is not at the level where it could be. This may have been a contributing factor to the lower response percentages that was reported by the ME's and NME's for "pollution" and "water" awareness programmes, compared to other types of awareness.

3.2.6.3 Air pollution related awareness of Transnet

The response percentages for the ME's (56.90%) and NME's (34.2%) are low relative to other types of awareness programmes within Transnet and other target groups (Table 4.2.5; Table 4.2.6).

There were no "air pollution" awareness programmes scheduled for employees (ME's and NME's) during the time of collection of data for this study (uMoya-NILU, 2016a). According to uMoya-NILU (2016c) the role of TNPA in air quality management in the Port of Cape Town was not properly understood among internal and external stakeholders. uMoya-NILU (2016c) also found that the engagement of internal and external stakeholders regarding air quality was relatively poor. This study that was commissioned by Transnet to uMoya-NILU (2016a) indicated that air quality in the Port of Cape Town was very poor without a clear management plan or awareness programme. Furthermore, that study indicated that the Port of Cape Town has limited air quality management competence and capacity. This is corroborated by the relatively low response percentages from Transnet ME's and NME's for "air pollution" awareness. Similar results were found for contractors in heading 3.2.1 and tables 3.2.5 - 6.

It can be concluded that there is a limited number of air pollution awareness programmes that is offered in the Port of Cape Town. In the light of TNPA's oversight role (as indicated in Section 11 of the National Ports Act), as landlord of the port users, there is an obligation to influence the users to be legally compliant regarding air quality management (Republic of South Africa, 2005). For compliance with legislation, the TNPA is also responsible for regulating all operations. Transnet's own policy on SHEQ requires it to influence port users to be legally compliant and provide appropriate

awareness to employees (Transnet SOC Ltd, 2020). South Africa is a signatory to the MARPOL convention. The International Convention for Prevention of Pollution from ships (1973 and its 1978 protocol), which became effective on October 2, 1983, “is an international response to the threat of contamination of the marine environment” (MARPOL, 1973; MARPOL, 1978). There are benefits for the Port of Cape Town to implement MARPOL regulations. One of these benefits is the reduction of emissions from operational activities in the port. In the interview with the local government the officials stated that “...*the awareness on compliance and enforcement that needs to be carried [out] as far as pollution and waste is concerned...*” Vissers (2010) stressed that air pollution and its health impacts must be understood. This can be done by providing effective air pollution awareness programmes to employees of Transnet in the Port of Cape Town.

3.2.7 Waste License Permit Holder responses (ME’s & NME’s) concerning the types of environmental awareness programmes

There were statistical significant differences within the managerial employees (ME’s) and the non-managerial employees (NME’s) in terms of the responses regarding the types of environmental awareness programmes ($P < 0.05$) (Table 3.2.5; Table 3.2.6). The WLPH’s response percentages varied from 9.1 to 81.8% for ME’s, while it ranged between 47.0 and 83.3% for NME’s (Table 3.2.5; Table 3.2.6).

Section 56(2) of the National Ports Act (no. 12 of 2005) gives powers to the authority (in this case TNPA) to monitor and annually review performance of the operation of the terminal and facilities and the provision of relevant services in terms of performance standards specified in the agreement and the competency of the employees in those operations (Republic of South Africa, 2005). Furthermore, licence conditions states that “only employees with the applicable awareness and training required by the relevant legislation may be utilised by the licensee.” Awareness programme records must be made available to TNPA upon request (TNPA, 2011). Section 56(2) requires any organisation that want to provide services in the waste sector within the port environment to apply for a waste permit with TNPA. Part of the approval criteria requires evidence of environmental awareness programmes (Appendix B15). Once the application is approved, the WLPHs may operate within the port for a period of five years. The applicant may reapply for a new permit before it

expires. TNPA personnel should conduct oversight audits on a yearly basis for the period of five years or as long as the licence is active.

The TNPA SHEQ department plays the oversight role over the WLPH's by conducting annual audits and SHE awareness programmes (Appendix B16). One of the SHEQ department's ES's is responsible for the yearly audits of WLPH's. However, this ES also has other responsibilities in the port besides the oversight over WLPH's. Part of the WLPH oversight functions of the ES is to verify the environmental awareness programmes offered to the employees of WLPH's. The WLPH's are not located on the premises of the port on a permanent basis. They only come to the port premises for collection of waste that must be disposed. Even though they are not located in the port, they must still adhere to the TNPA requirements. The ES can issue non-conformance notices where environmental awareness programme records cannot be provided by the WLPH's for audit purposes (Appendix B11).

From here the discussion focusses on the response of the ME's and NME's in terms of different types / components (waste, pollution, air, water, and oil spill) of environmental training programmes.

3.2.7.1 Waste and oil spill related awareness of WLPH's

The ME's (81.8 %) and NME's (83.3 %) response percentages were very close to each other regarding "waste" awareness programmes for WLPH's (Table 3.2.5; Table 3.2.6).

Waste is the core business of WLPH's. These companies have waste license permits from TNPA, the local authority and the relevant national department. They must comply with legislative requirements for any of their operations to function. In order for a company to be issued with a license permit to handle waste, they need to provide appropriate awareness programmes to their employees as part of the requirements, amongst others. This is a requirement of the Waste Act (no. 59 of 2008) as amended in the national government notice no. 1093 of 2017 (DEA, 2017), and also the City of Cape Town (2010b) Integrated Waste Management By-law. All waste service providers must be appropriately licenced and registered with the relevant authorities in line with all the statutory requirements (City of Cape Town, 2010b; Republic of South Africa, 2008a). This is one of the major reasons why the response percentages for

“waste” awareness programmes were so high for WLPH ME’s and NME’s relative to other target groups.

The response percentages for “oil spill” awareness programmes were the highest for the WLPH’s compared to the other target groups (ME’s [83.8%] and NME’s [80.3%]) (Table 3.2.5; Table 3.2.6). The WLPH’s have developed emergency standard operating procedures to deal with any oil spill event. This is a fundamental part of their functions in the port. Most of the WLPH’s operating in the Port of Cape Town can handle oil spill clean-ups as part of their operations. For oil spill incidents a WLPH activates a response team to ensure minimal negative impact on employees, contractors, the environment, and the public at large. To provide an effective response to oil spill incidents all WLPH employees are offered awareness programmes to help them respond appropriately to such emergencies (DCD Marine Cape Town (Pty) Ltd, 2015a). They need to ensure that appropriate awareness on oil spill management is offered to their employees, otherwise their licence permits will not be issued or renewed. This study revealed that WLPH’s indeed comply with regards to “oil spill” awareness programmes, as can be seen by the response percentages that were higher than for any of the other target groups.

3.2.7.2 Pollution and water related awareness of WLPH’s

The ME’s response percentage for “pollution” related awareness was 54.5%, while the response percentage for “water” related awareness was 45.5%. The NME’s response percentage for “pollution” related awareness was 62.1 %, while it was 54.5% for “water” (Table 3.2.5; Table 3.2.6).

The SHE policies of the WLPH’s indicate that their management structures are committed to creating a safe working environment for its employees, by preventing pollution, being cautious in using water and conducting the business in an environmentally friendly manner (DCD Marine Cape Town (Pty) Ltd, 2015b). Furthermore, to raise the level of awareness to ensure that the employees are competent to do their work and protect the environment (Swift Tank and Oil Solution, 2015; DCD Marine Cape Town (Pty) Ltd, 2015c). The WLPH’s developed EMP’s for their operations. The majorities of the WLPH’s had appointed environmental officers (EO). Among other functions the EO responsibilities are to ensure that the EMP is

implemented in issues regarding “pollution” and “water” in the operations. Environmental awareness programmes must be provided to all the employees at the work site in order for them to familiarise themselves with the environmental aspects of the relevant EMP (DCD Marine Cape Town (Pty) Ltd, 2016). The WLPH’s where waste is permitted in their depot for a few days while sorting the recyclables from waste, the activity can easily constitute pollution in the surroundings. Furthermore, washing of waste reception facilities and trucks in the designated basin in the depot was to avoid water pollution or ground water contamination (Wasteman Holdings, 2013, 2015). It was compulsory for the NME’s to attend “water” and “pollution” awareness programme. The records of these awareness programmes are kept for audit purposes conducted by TNPA ES.

The emphasis of “pollution” and “water” was mainly to those employees that visit the port due to operational requirements within the port premises. In their operational activities the employees are made aware to avoid any possible pollution or water related issues when working at the client’s (in this case Transnet) premises. This is compulsory for any WLPH employee operating in the port (TNPA, 2017a&b; TNPA, 2014d). The records of the attendance should also be kept for audit purposes. It should be considered that the scope of work of WLPH’s do not necessarily always include “pollution” and “water” issues, especially in the port. However, “pollution” and “water” issues are of importance in the port environment (TNPA, 2014d). The lower level of response compared to the “waste and “oil spill” awareness response may not mean that “pollution” and “water” awareness are neglected, but rather that it is not always a priority in their operations. It is thus not necessarily a negative finding. It is possibly a consequence of their normal operational functions in the port.

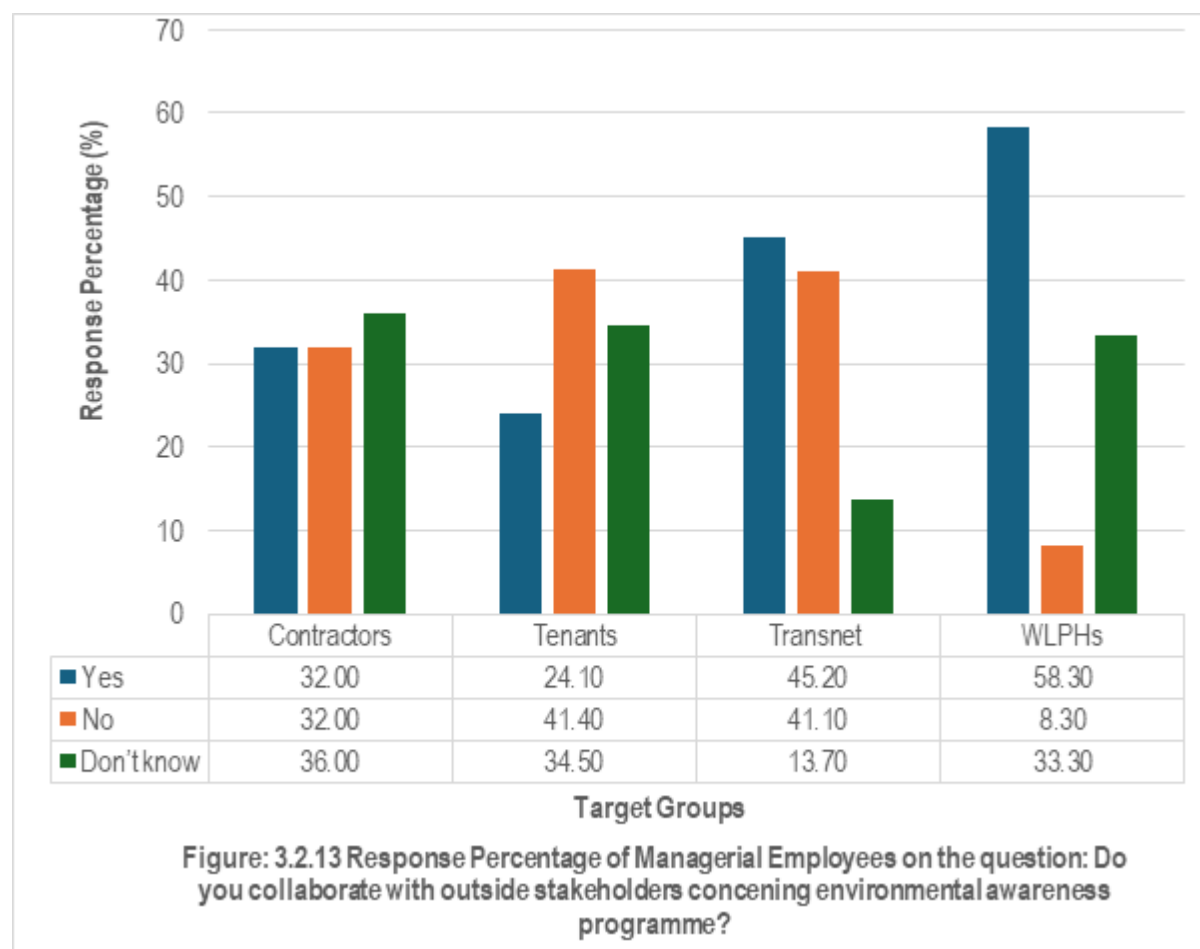
3.2.7.3 Air pollution related awareness for WLPH’s

The response percentages of the ME’s (9.1%) and NME’s (47.0%) for “air pollution” awareness were the lowest response percentages recorded (Table 3.2.5; Table 3.2.6).

“Air pollution” awareness is of a lower priority for WLPH’s. The EMPs of the WLPH’s indicate that all waste transport vehicles are placed on a maintenance schedule and are regularly serviced as a control measure to manage unnecessary emissions into the air. Additionally, when vehicles go for servicing, testing of NO_x (nitrogen oxides)

emissions is also completed (DCD Marine Cape Town (Pty) Ltd, 2015c). The reason why “air pollution” is a low priority for them could simply be that it is outside the scope of their activities and “air pollution” is not part of their responsibilities to manage. The fact that they transport waste does not make them responsible for air pollution management. Furthermore, it was indicated that air pollution awareness programme was offered insufficiently due to the odours for the WLPH’s where waste is permitted in their own depot not in the port but for few days and also for sorting purposes. It was therefore compulsory for the NME’s to attend an air pollution awareness programme due to their operational activities identified in their risk register (Waste Busters (Pty) Ltd, 2021 & 2014). It should be noted that stockpiles of waste may produce foul odours and dust that may become air pollution hazards. There is a need for continuous improvement with regards to air pollution. It is recommended that the odours and dust produced either in or out of the port (onsite) should be monitored so that the necessary control measures can be put in place for the health of employees and the environment.

3.2.8 Responses of managerial employees (ME's) of all target groups regarding collaboration with outside stakeholders concerning environmental awareness programmes



There were no statistical significant differences between the ME's from all the target groups with regards to collaboration with outside stakeholders on environmental awareness programmes ($P > 0.05$) (Figure 3.2.13).

The “yes” and “no” responses did not differ from each other significantly within the same target group. The exception was WLPB's. In that case the “yes” and “no” responses differed vastly from each other. The uncertainty of the “don't know” response may be interpreted as a negative response and can be considered to be closer to a “no” response than a “yes” response, or even a sign of a certain level of ignorance. If there was collaboration with outside stakeholders, it would surely have been known to those ME respondents.

An interview was conducted with the Solid Waste Management Department of the City of Cape Town. They responded to the question: “Do you collaborate with outside stakeholders concerning environmental awareness programmes?” The responses were:

“The Port of Cape Town is accredited as waste generator and has been assessed by the City of Cape Town [and] was accredited for proper management of waste at the ports.”

“The solid waste department is always engaged on solid waste issues and advice is given to ensure compliance and clarity.”

“The local authority involves the waste transporters for licensing and registration of their vehicles for transportation of waste requirements.”

The same question was asked in an interview with the Environmental Resources Department of the City of Cape Town. Their responses were:

“The awareness on compliance and enforcement that needs to be carried as far as waste and pollution is concerned.”

“The engagement is on compliance and to assist where necessary to control environmental disaster”.

“All the waste plans, by-laws and documents are always made available for public comment and input before finalization and promulgations”.

Most ME’s of the contractors (36%) chose the “don’t know” option on the question “do you collaborate with outside stakeholders concerning environmental awareness programmes”(Figure 3.2.13). An equal number of ME’s chose the “no” and “yes” options (32.0%) (Figure 3.2.13).

The ME’s of tenants mostly chose the “no” option (41.4 %) for this question (Figure 3.2.13). The results also revealed that 34.5% of the ME’s chose the “don’t know” option, while only 24.1% chose the “yes” option (Figure 3.2.13).

The ME's of Transnet (45.2%) and WLPH's (58.3%) mostly chose "yes". The "no" option response drew 41.1% from Transnet and 8.37% from WLPH's (figure 3.2.13), while the option of "don't know" received response percentages of 13.7% and 33.3%, respectively.

The Port of Cape Town introduced a "go green" project campaign to its Transnet employees and other port users as part of an environmental awareness programme (Appendix B17). This was an annual event, which were joined by the contractors, tenants and WLPH's. However, many of the attendees were from Transnet. In heading 2.9.2 (contractors sampling procedure) it is explained that most contractors normally spend a brief period to do their work and then leave the port, depending on the scope of work. In addition to this, most of the ME's (57.1%) responded to the question "what is the nature of the job?" that their basic conditions of employment were fixed period contracts (Appendix A12.1&2). The ME's in the organisation structures are responsible for specific portfolios as far as the job requirements is concerned (TNPA, 2010a; DCD Marine Cape Town (Pty) Ltd, 2015a; Raubex Construction Pty (Ltd), 2017). The fixed period contract time limit in conjunction with a variety of portfolio responsibilities may possibly affect decisions on the possibility of having collaboration with outside stakeholders to offer awareness programmes to employees during the operational activities. Certain ME's may not specifically deal with outside stakeholders on awareness programmes, hence the relatively high levels of "don't know" responses from ME's. Also, the "go green" campaign could have happened outside of their period of operational activities in the port. Furthermore, it may not be useful to attempt to have collaborative links with outside stakeholders to help with environmental awareness of employees before a particular contract starts, since many contracts are for a relatively short period (two weeks to a month). In spite of these constraining factors, environmental awareness programmes still take place as indicated in earlier headings. The equal "yes" and "no" (32%) responses from contractor ME's could be due to environmental awareness programmes taking place internally in some cases, as well as through external stakeholder engagements in other situations. DEA&DP (2007) stated that the dry docks ship repair industry creates a wide variety of employment opportunities and is labour intensive. All these employment opportunities may not happen at the same time with all the employees on site at the same time. The environmental awareness requirements may differ depending on the job being done.

The employment may also take place gradually as the scope of work unfold. Due to this dynamic in operations, it is possible for a mix of internal and external collaborations with stakeholders as far as environmental awareness programmes are concerned.

The tenant results indicated that there is less collaboration with outside stakeholders compared to the other target groups. Most of the awareness programmes are conducted in-house by the environmental specialists of their organisations (Swift Tank and Oil Solution, 2015; DCD Marine Cape Town (Pty) Ltd, 2015c). In a few cases only a few of the employees are allowed to attend environmental awareness workshops or campaigns. These employees in return will share their experiences in the awareness workshops with the rest of their colleagues. This method of raising awareness could be allowed to accommodate the operational requirements as a priority instead of releasing all the employees at once. It is possibly more economically viable to adopt this implementation method, and it would be to the benefit of the organisation. The “don’t know” responses may be due to the ME’s not dealing with such issues of environmental awareness in their capacity at their organisations.

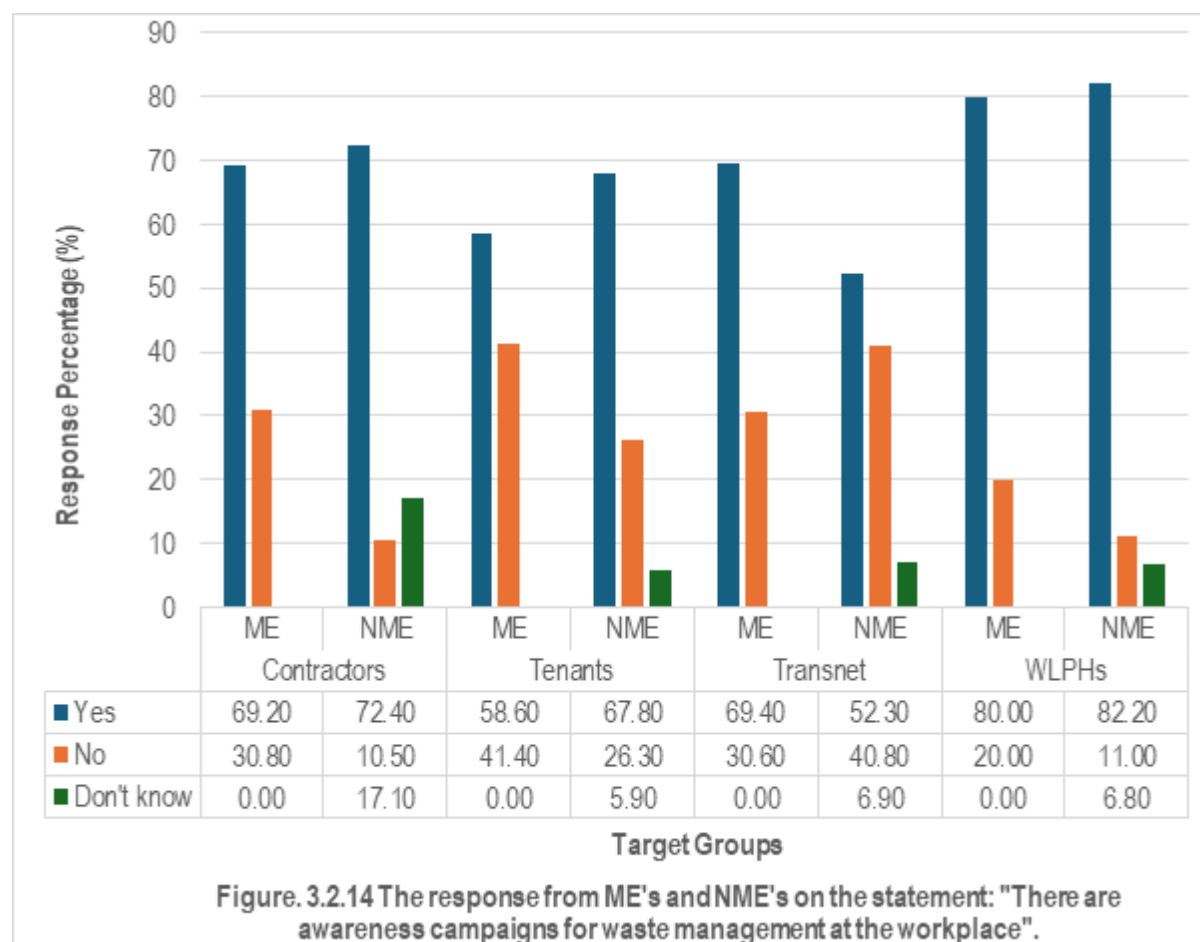
The ME’s of Transnet mostly chose the “yes” option (45.2%). 41.1% chose the “no” option, while 13.7% chose the “don’t know” option (Figure 3.2.13). Transnet has many years of experience of collaborating with different outside stakeholders with regards to various environmental awareness programmes. For instance, the Port of Cape Town hosted a port clean up and marine awareness programme in collaboration with the City of Cape Town, Mpac, Royal Yatch Club and Plastic SA (Appendix B18). Other collaborative awareness programmes have also been conducted together with the South African Maritime Safety Authority (SAMSA) and the Department of Transport (DoT), where awareness workshops and simulation exercises were provided on oil spills and pollution control for environmental protection, among others (Appendix B19). Furthermore, Transnet hosted a collaboration with the Department of Environmental Affairs (DEA) and the Norwegian government on marine and pollution awareness programmes (DEA, 2019; Appendix B20). The study revealed that Transnet is collaborating with a number of outside stakeholders on matters that relate to environmental awareness programmes. It is thus not surprising that the “yes” response percentage (45.2%) is at a higher level for ME’s within Transnet, in terms of collaboration with outside stakeholders on environmental awareness matters. As

indicated earlier under this heading, the results of the interviews with City of Cape Town departments on the question: “Do you collaborate with outside stakeholders concerning environmental awareness programmes?” The City of Cape Town affirms the results of Transnet ME’s response that indeed there is collaboration which involves relevant entities that deal with environmental issues. Transnet does not only attend these events but also play facilitation roles in, for example, the international conferences where local, provincial and national government, as well as industries, academia and communities are involved in matters related to environmental conservation, as was the case in the sustainable blue economy conference in Nairobi Kenya (26 - 28 November 2018) (Appendix B21). The above indicated that Transnet is collaborating on various platforms with outside stakeholders as far as collaboration in matters of environmental awareness. The response percentage for the “no” option might be due to certain ME’s working during night shift hours, which does not give them an opportunity to participate during the above-mentioned collaboration programmes with outside stakeholders because these activities normally take place during the course of the day. Additionally, these ME’s who selected the “no” option may not be dealing with environmental awareness programmes as part of their normal tasks and responsibilities.

The core business of WLPH’s rely on the compliance with governmental and legal requirements. The South African DEA have waste management forums in place (Appendix B22). More often the WLPH’s will participate in the programmes and workshops organised by the DEA (Appendix B23). DEA have also signed a Memorandum of Understanding (MoU) with private sector partners for better waste management in South Africa, especially with those who deal with waste on a day-to-day basis. This process has been taking place without any formal collaboration processes. The collaboration is to allow the Waste Management Regulator and the private sector partners to debate on mutual interests of the environment and to find solutions that benefit the entire industry (Manyana, 2019). This may help to explain the high “yes” response percentages from WLPH ME’s. It is clear from the interview responses (indicated in heading 3.2.8 of City of Cape Town officials that they create opportunities to collaborate on environmental awareness programmes with port users such as WLPH’s. According to Koontz *et al.*, (2010), governments around the world have realised that in order to solve environmental problems, it is crucial to collaborate

with other stakeholders (such the target groups in the present study) to be able to solve environmental challenges. The process becomes a win-win situation whereby both the government and the stakeholder benefit. Each have roles of responsibility, although the government has a wider range of roles. Wassmer *et al.* (2014) argued that the majority of companies, since the 2002 World Summit on Sustainable Development (Johannesburg Earth Summit), have realized the opportunities and ways to neutralize environmental threats by being involved in environmental collaborations. Collaboration processes in the direction of environmental awareness programmes have been receiving a positive increase among business practitioners, policy makers, universities, and other constituents (Hartman *et al.*, 1999). Organisations cannot afford to address environmental awareness without involving other stakeholders; a joint venture with other stakeholders is particularly important for success (Seuring & Gold, 2013). It is evident that the WLPH's make use of the opportunities of collaboration as far as environmental awareness is concerned. Prominent levels of environmental awareness collaboration are to the advantage of the WLPH's, their customers and government.

3.2.9 Responses from managerial employees (ME's) and non-managerial employees (NME's) of all target groups on the statement: "There are awareness campaigns for waste management at the workplace"



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement posed to them: "There are awareness campaigns for waste management at the workplace" ($P > 0.05$) (Figure 3.3.14).

The contractor ME's and NME's overwhelmingly chose the "yes" option (69.2 and 72.4%, respectively) for the statement: "there are awareness campaign for waste management at the workplace" (Figure 3.3.14). The ME's (30.8%) and NME's (10.5%) chose the "no" option to a much lesser degree. No ME's chose "unknown", while only 17.1% of the NME's chose this option (Figure 3.3.14).

The ME's and NME's of the tenants overwhelmingly chose the "yes" option (58.6 and 67.8%, respectively)" (Figure 3.2.14). Much less of the ME's (41.4%) and NME's (26.3%) chose the "no" option. A few of the ME's and NME's chose the "unknown" option (0 and 5.9%, respectively) (Figure 3.2.14).

Transnet ME's and NME's mostly chose the "yes" option (69.4% and 52.3%, respectively) (Figure 3.2.14). Less of the ME's (30.6%) and NME's (40.8%) chose the "no" option. Only a few ME's chose the option of "unknown" (6.9%) (Figure 3.2.14).

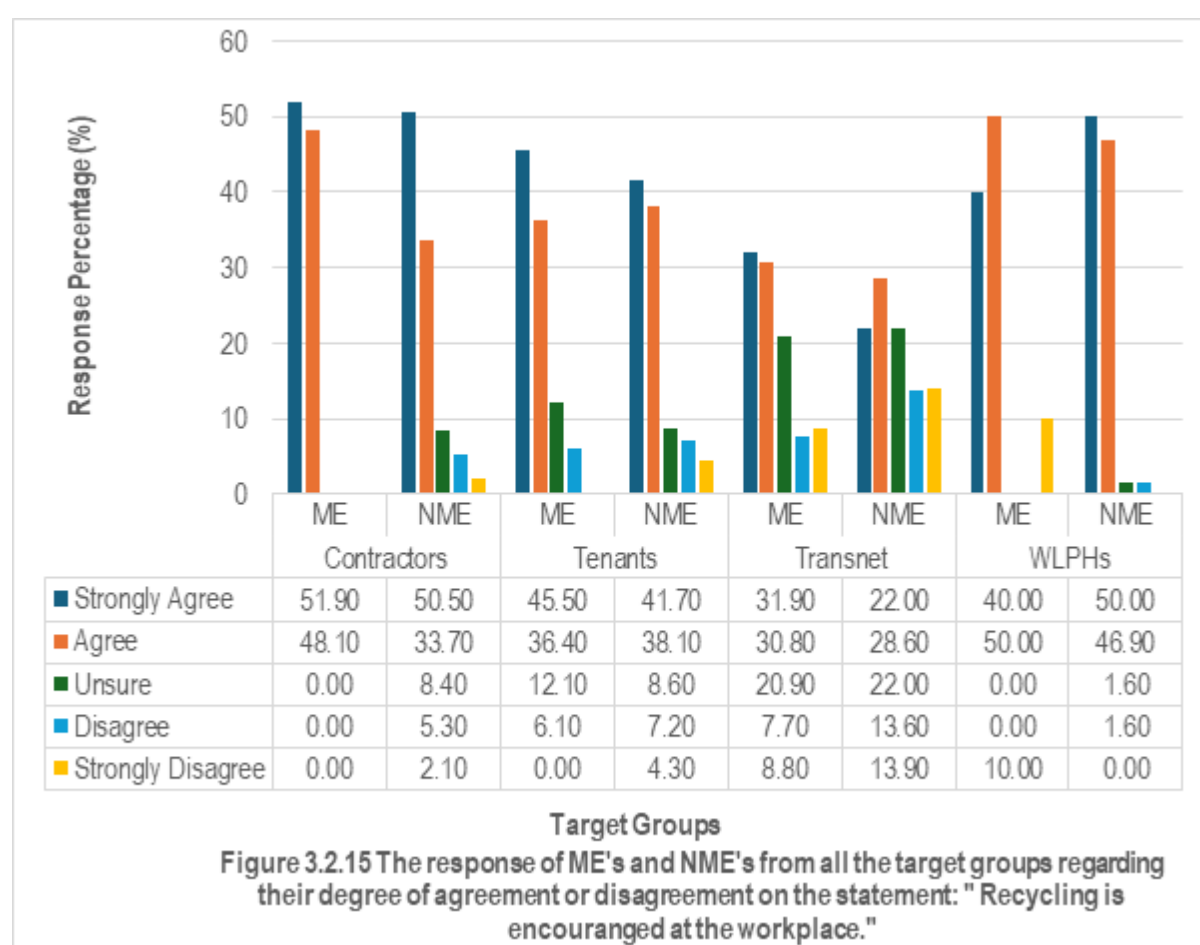
The ME's and NME's of the WLPH's overwhelmingly chose the "yes" option (80.0 and 82.2%, respectively) (Figure 3.2.14). Much less of the ME's (20.0%) and NME's (11.0%) chose the "no" option of "no". Only some NME's chose the option of "unknown" (6.8%) (Figure 3.2.14).

The environmental specialists / officers of the contractors, tenants, Transnet and WLHP's coordinate environmental awareness campaigns in their workplace (DCD Marine Cape Town (Pty) Ltd, 2015a&c; Swift Tank and Oil Solution, 2015). These organisations follow the Indalo Yethu concept. Indalo Yethu is a government initiative to help people redefine their relationship with the environment, with the primary objective to arouse "eco-activism" and advocate a greening agenda for big projects. The campaigners (target groups) develop projects that has a plan to minimize energy and water consumption, and reduce waste and pollution (DEA, 2007).

The Port of Cape Town introduced an annual "Go Green" project campaign to its employees as the main target and to other port users as part of an environmental awareness programme (Appendix B24.1). The awareness campaign was advertised in advance so that the employees of Transnet are able to participate, as well as other port users. This campaign was advertised in the company's newsflash, notice boards and emails. It was also promoted in the management meetings and green area meetings (Appendix B24.2). Some of the tenants were supporting the awareness campaigns of the Volvo Ocean Race (VOR 2014/15), which took place on the premises of Port of Cape Town and the V&A Waterfront. The race was also promoting sustainable clean seas in the fight against plastics in the oceans. The race organisers were also playing their role in support of the strategy of the United Nations Environmental Clean Seas Campaign in the fight against marine litter (UNEP, 2019).

In the process the race involved some tenants due to operational activities to be rendered. Transnet was also benefiting in generating revenue by leasing the land to host the race, among others. It is likely that these awareness campaigns played an important role in response percentages of all target groups.

3.2.10 Responses of managerial employees (ME's) and non-managerial employees (NME's) from all the target groups regarding their degree of agreement or disagreement on the statement: "Recycling is encouraged at the workplace"



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement posed to them: "Recycling is encouraged at the workplace" ($P>0.05$) (Figure 3.2.15).

The ME's and NME's of the contractors overwhelmingly chose the options of "strongly agree" (51.9 and 50.5%, respectively) and "agree" (48.1 and 33.7%, respectively) for the statement: "Recycling is encouraged at the workplace" (Figure 3.2.15). Only NME's (8.4%) chose the option of "unsure". No ME's chose "disagree" or "strongly disagree". Only few NME's chose the options "disagree" (5.3%) and "strongly disagree" (2.1%) (Figure 3.2.15).

The ME's and NME's of the tenants overwhelmingly chose the options of "strongly agree" (45.5% and 41.7%, respectively) and "agree" (36.4 and 38.1%, respectively) (Figure 3.4). Much less of the ME's (12.1%) and NME's (8.3%) chose the option of "unsure". A few of the ME's and NME's chose the options of "disagree" (6.1 and 7.2%, respectively) and "strongly disagree" (0% and 4.3%, respectively) (Figure 3.2.15).

The ME's and NME's of Transnet mostly chose the options of "strongly agree" (31.9% and 22.0%, respectively) and "agree" (30.8 and 28.6%, respectively) (Figure 3.2.15). Other ME's (20.9%) and NME's (22%) chose the option of "unsure". A few of the ME's and NME's chose the options of "disagree" (7.7 and 13.6%, respectively) and "strongly disagree" (8.8% and 13.9%, respectively) (Figure 3.2.15).

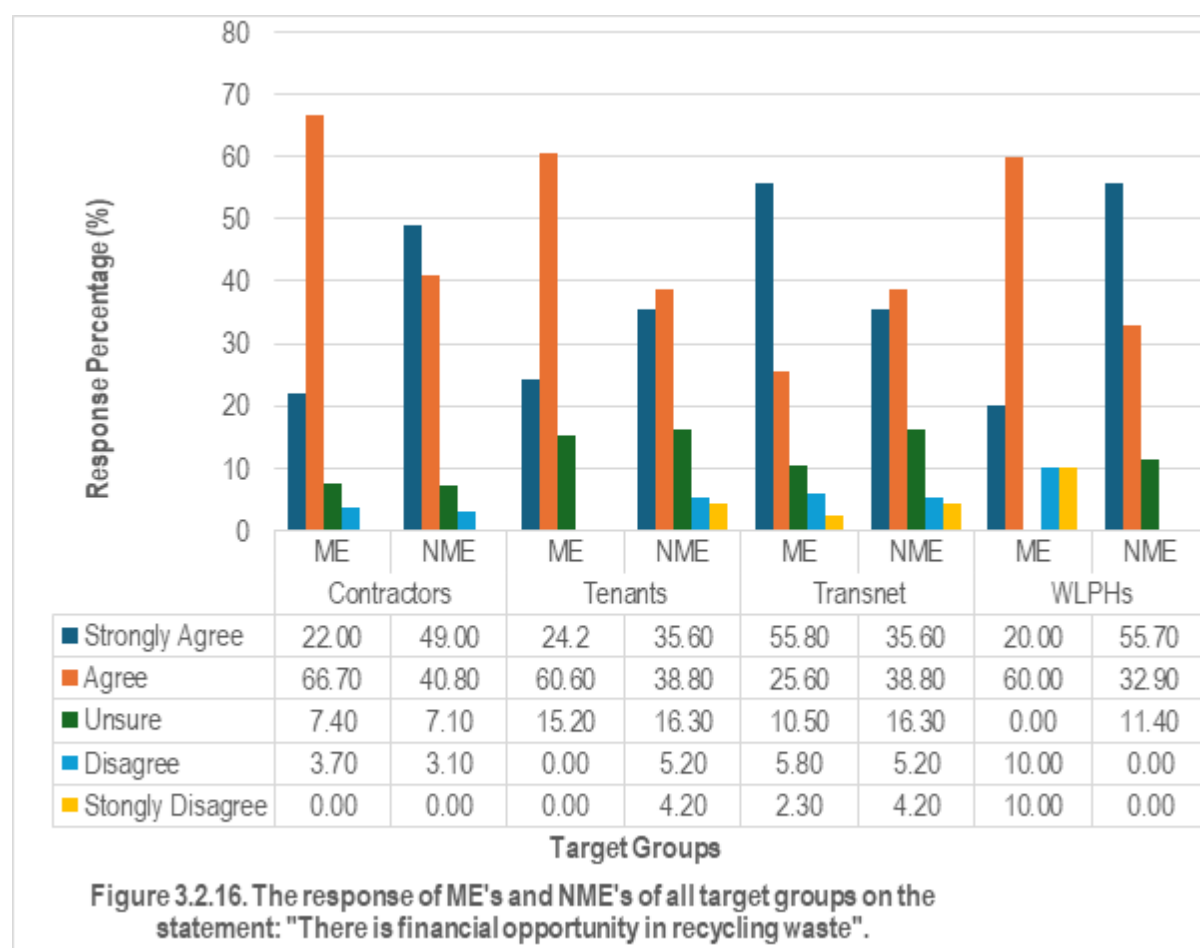
The ME's and NME's of the WLPH's overwhelmingly chose the options of "strongly agree" (40.0% and 50.0%, respectively) and "agree" (50.0 and 46.9%, respectively) (Figure 3.2.15). Only NME's (1.6%) chose the option of "unsure". A few of the ME's and NME's chose the options of "disagree" (0.0% and 1.6%, respectively) and "strongly disagree" (10.0% and 0.0%, respectively) (Figure 3.2.15).

The TNPA has developed a Safety, Health and Environment Induction Manual (SHEIM) for all SHE induction programmes. There are also induction manual (SHEIM) training booklets, awareness pamphlets that are provided to the contractor employees for ease of reference or to read at their own time. In these materials recycling is included (TNPA, 2015a). According to Transnet SOC Ltd (2017a) contractor procedures require the contractor managerial employees to provide a Safety Health and Environmental Plan (SHEP) file. In the SHEP file the recycling element must also be included. This file, among other returnable documents, must indicate that the EMP cover recycling in their operations (Transnet SOC Ltd, 2017a; Swift Tank and Oil

Solution, 2015). The EMP's provided to the property department of TNPA by the tenants as part of returnable documents indicates the management of waste and its hierarchy, including recycling (DcD Marine Cape Town (Pty) Ltd, 2016). The annual audits are conducted by the ES of TNPA to verify proper waste management, among other audit processes. Awareness programmes on recycling are provided with evidence of employees attended these sessions (attendant register). These awareness programmes are conducted by the environmental specialist / officers of the tenants. Except these, on-site tenants should have different waste reception facilities for recycling (Appendix B26). Transnet has been gradually deploying recycling facilities in the Port of Cape Town (Appendix B27). There are also notice boards highlighting recycling awareness (Appendix B28). These activities and practices show that the port is indeed encouraging recycling at the workplace in various ways. In Transnet operations there are many materials that can be recycled but needs proper waste management. For instance, clean dredged material is one of them; also, plastic bottles are taken for recycling but on *ad hoc* basis (TNPA, 2015a). Recycling is part of the core business of WLPH's as indicated in heading 2.9.4 (waste licence permit holders sampling procedure). Furthermore, the environmental management plans of the WLPH's show recycling as part of the process to be followed in conducting their business operations (Swift Tank and Oil Solution, 2015). It is the duty of the organisational environmental specialists / officers to ensure that recycling is implemented as per the EMP requirements. The employees are not only encouraged to recycle but are also exposed to daily operations that include recycling. Additionally, the annual audits are conducted by the ES of TNPA to verify waste management practices, among other audit processes, and the implementation of EMP's onsite. The audit report of 2016 indicated that awareness programme on recycling was provided with evidence of employees attended the sessions (TNPA, 2016) and the action plans for EMP's. It is not surprising for the response percentage of both ME's and NME's to be overwhelmingly high. In the study conducted by D'souza *et al.* (2010) in a Dubai workplace, the participants criticized the company action in not providing educational awareness and training activities for information sharing in platforms such as workshops and seminars to encourage employees in environmental related practices. It is not surprising that all the target groups (contractors, tenants, Transnet and WLPH's) in the present study indicated response percentages in agreement or strong agreement to the statement: "Recycling is encouraged at the workplace." This is due

to the interventions put in place concerning the encouragement of recycling in their workplaces.

3.2.11 Responses of managerial employees (ME's) and non-managerial employees (NME's) of all the target groups on the statement: "There is financial opportunity in recycling waste"



The ME's and NME's of the contractors overwhelmingly chose the options of "strongly agree" (22.0% and 49.0%, respectively) and "agree" (66.7% and 40.8%, respectively) (Figure 3.2.16). Much less of the ME's (7.4%) and NME's (7.1%) chose the option of "unsure." None of the ME's and NME's chose "disagree" and "strongly disagree" (Figure 3.2.16).

The ME's and NME's of the tenants overwhelmingly chose the options of "strongly agree" (24.2 % and 49.3%, respectively) and "agree" (60.6% and 34.0%, respectively) (Figure 3.2.16). Much less of the ME's (15.2 %) and NME's (11.8 %) chose the option

of “unsure”. A few of the ME’s and NME’s chose the options of “disagree (0.0 % and 4.9 %, respectively) and “strongly disagree” (0.0 % and 4.0 %, respectively) (Figure 3.2.16).

The ME’s and NME’s of Transnet mostly chose the options of “strongly agree” (55.8% and 35.6%, respectively) and “agree” (25.6% and 38.8%, respectively) (Figure 3.2.16). Much less of the ME’s (10.5 %) and NME’s (16.3 %) chose the option of “unsure”. A few of the ME’s and NME’s chose the options of “disagree (5.8% and 5.2%, respectively) and “strongly disagree” (2.3% and 4.2%, respectively) (Figure 3.2.16).

The ME’s and NME’s of the WLPH’s overwhelmingly chose the options of “strongly agree” (20.0% and 55.7%, respectively) and “agree” (60.0% and 32.9 %, respectively) (Figure 3.2.16). Only a few NME’s (11.4%) chose the option of “unsure”. A few of the ME’s and NME’s chose the options of “disagree (10.0 % and 0.0%, respectively) and “strongly disagree” (10.0% and 0.0%, respectively) (Figure 3.2.16).

Figure 3.2.15 shows result that indicate that recycling is encouraged at the workplace. Among other reasons for encouraging recycling at the workplace is the potential benefit of financial gain. It has become a popular practice to recycle materials and to educate employees on the benefits of doing so. Most industries realised that recycling create incentives, among other things, financial incentives (Tam & Hao, 2016; Hamed *et al.*, 2019). Similar financial incentives were also realised by the contractors. The Port of Cape Town provides ship dismantling services on a small scale. This operation allows most of the dismantled parts to be sold for re-use or recycling. Many of the contractors benefit financially in this operation (TNPA, 2018c). There are contractors in the Port of Cape Town whose core business is the dismantling of ships (Appendix B25).

There are tenants in the Port of Cape Town, whose business operations cater for ship dismantling. Due to this activity, there could be financial gain from recycling for these tenants. Furthermore, the Port of Cape Town also recycle its office paper. A recycling company has a contract with Transnet for this purpose (TNPA, 2015g & 2020a). The funds generated from office paper recycling are deposited to the finance department account of the Port of Cape Town.

Recycling is part of the core business of WLPH's. The WLPH's collect the recyclable material as part of their services and further processes it for recycling. If they are not able to process, they will package it for reselling to other organisations and get financial benefits. For instance, there are other WLPH's that processes mixtures of oil and water for recycling purposes, where others will package papers, while others transport steel for re-selling for re-use or recycling. This depends on each of the WLPH's specialised line of trade. It thus makes perfect sense that all the target groups overwhelmingly responded, "strongly agree" or "agree" to the statement: "there is financial opportunity in recycling".

ABSTRACT

The environmental education and training programs worldwide continue to gain recognition as a vital instrument for many corporate and environmental strategies. In order to encourage employees to develop an environmentally awareness behaviour and to make environmentally responsible decisions in the workplace, educating and training of the employees is an important aspect of any management initiative. The purpose of the current study is to establish types of environmental training programmes for the port users. What are the possible barriers or opportunities on the programmes? Furthermore, what is the role of authority when it comes to environmental training programmes as it pertains to waste and pollution for port users. The data has been analysed by using SPSS 25 software programme and Microsoft Office Excel. The study revealed that waste, pollution, air, water and oil spill are types of environmental training programmes for the Port of Cape Town users. The contractors found to be the leading organisation in most of the environmental training programmes ranged from 96-68 % (Managerial Employees) and 82-54% (Non-Managerial Employees). Surprisingly, TNPA ranked quite low compared to the other target groups in terms of environmental training programmes. A contributing factor seemed to be the TNPA financial moratorium. The opportunity was for Transnet as an organisation to include environmental component in their induction programme for dry docks operations. There were also environmental trainings that are aiming to protect the environment. The government is providing environmental programmes for stakeholders.

4.1 INTRODUCTION

Environmental training continues to gain recognition across the world as a vital instrument for many corporate and environmental strategies (Wong, 1998; Beard, 1996). Many companies have considered education as a crucial tool to make a significant and long-lasting change in their work environment for the benefit of their employees (Hale, 1995). For new ideas and strategies to succeed, the training process must incorporate: (i) strategy development process; (ii) be transformative in nature; and (iii) an individual learning must be converted to company goals as quickly and efficiently as it is possible (Kuhn & Marsick, 2005). For the employees to learn and adapt to the new mindset, attitudes and skills development through training is required (Saunders & McGovern, 1993). There is evidence that indicate that most of the companies that implement environmental training programmes experience positive outcomes (Cook & Seith, 1992).

With properly designed training, employees are encouraged and motivated to explore the environment as a personal investment by empowering themselves in the workplace, within society and in the environment (Law *et al.*, 2017). Training programmes transform employees and lead to more environmentally responsible behaviour. These types of programmes embrace the idea of altering the organisational culture (Monroe & Chambers, 2000). Lamm *et al.* (2013) advocated that employees who embrace positive attitudes have greater adaptability to direct their behaviour towards activities that are in line with the goals and values of the employing organisation.

Jørgensen (2000) stipulates that for an organisation to achieve continuous environmental improvement, it is required from the organisation to be prepared to change. This change is particularly important, as the key step for encouraging change in a working environment is to involve participation throughout the entire organisation (Nadler, 1981). Kotter and Schlesinger (1979) argue that during the organisational change process, there are possibilities of resistance. In order to overcome this challenge, participation in training programmes can bridge that gap to reduce resistance, create a sense of ownership in individuals in the organisation and further motivate employees to take a step towards change. Monroe and Chambers (2000) states that training programmes that are successful transform and lead to more

environmentally responsible behaviour that alters the organisational culture towards the environment.

In order to encourage employees to develop positive environmental behaviour and to make environmentally responsible decisions in the workplace, educating and training of the employees is an important aspect of any management initiative (Baumgartner & Winter, 2013 & 14). In the study conducted by Law *et al.* (2017) employees who were provided with environmental training showed, in the outcome, a general gain in knowledge, and, changed values and behaviour towards the environment. Abid (2013) states that training also improves the performance of the employees. However, Perron *et al.* (2006) cautions that the success of training for productivity and performance is not universal. It is important to identify the training programmes that will enable the organisation to achieve its environmental objectives, while being productive and considering the time that will be required for such training programmes, including the cost implications (Cook & Seith, 1992; Deloitte Touche Tohmatsu, 2003).

According to the South African Skills Development (Act no. 97 of 1998) (RSA, 1998d) the purpose of this Act are as follows: - “(a) to develop the skills of the South African workforce. (i) to improve the quality of life of workers, their prospects of work and labour mobility; (ii) to improve productivity in the workplace and competitiveness of employers; (b) increase the levels of investment in education and training in the labour market and to improve the return on that investment; (c) to encourage the employers to: (i) use the workplace as an active learning environment; (ii) to provide employees with the opportunities to acquire new skills; (iii) to provide opportunities for new entrants to the labour market to gain work experience; and (d) to encourage workers to participate in learning programmes” (RSA, 1998d). Law *et al.* (2017) indicates that an evaluation of environmental training programmes is a technique to inform the organisation on how to advance the effectiveness of environmental training. Kirkpatrick and Kirkpatrick (2006) states that there are four evaluation training principles for training programmes.

The four evaluation training principles with a brief explanation for each level are:

(i) reaction

- Is an evaluation which is used to measure the participation in the training programme if, (a) it is supported, (b) was there any satisfaction from the participants in the programme and, (c) were the participants motivated were from what they have learned.

(ii) learning

- Is defined as any change of participants', (a) attitudes, (b) gained knowledge and, (c) increased skill due to the training programme offered.

(iii) behaviour

- Measuring of behavioural changes due to the training programme provided. When the first two principles are thoroughly applied and there was an acceptance from the participants a possible change is expected.

(iv) results

- The results are influenced by the training programme. The results may include:- (a) enhanced staff morale, (b) increased production, (c) decreased operation cost because of environmental performance.

These four principles are extremely critical. Therefore, all the training programme levels should be evaluated because all levels are correlated one to the other.

The research objectives as it relates to this chapter are: 1) to determine the current practices of port users regarding waste and pollution management as far as environmental training programmes are concerned; 2) to determine the potential barriers or opportunities as it pertains to waste and pollution as far as environmental training programmes are concerned; and 3) to determine the role of the relevant stakeholders (authorities) other than port users in the waste and pollution management in the port as far as environmental training programmes are concerned. 4) to review the documents of Transnet in relation to environmental training programmes.

4.2 RESULTS AND DISCUSSION

This section presents the results of the data collected from the survey conducted on different Port of Cape Town users. Transnet refers to the Transnet National Ports Authority (TNPA).

The target groups for the study were contractors, tenants, Transnet and waste licence permit holders (WLPH's), as well as selected government departmental officials as explained in chapter 2. Self-administered questionnaires were used for managerial employees (ME's) and non-managerial employees (NME's) of the four target groups. Structured interviews were used to collect data from government departmental officials. The collected data was tabulated and coded (Appendix A10.1&2). An explorative descriptive study and statistical analysis was done by using SPSS 25 software and Microsoft Office Excel (Shil *et al.*, 2013; Appendix 12.1&2). The data mainly consists of non-parametric ordinal and nominal data. The chi-square analysis was used to search for statistical significant influences of independent variables on dependent variables.

In certain of the questions the respondents were requested to tick all that apply. Therefore, it should not be expected that the columns or rows of the tables will add up to 100%, especially for Tables 4.2.1-6 (Appendix B1.1&2).

Table 4.2.1: Responses of managerial employees (ME's) from all the target groups regarding environmental training programmes offered to non-managerial employees (NME's)

	Options	Group: Difference: $\chi = 47.543$, df = 15, p-value <0.001							
		Contractor		Tennant		Transnet		Waste Licence Holder	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
What type of environmental training programmes do you provide to your employees?	Waste	24	96.0%	25	92.6%	42	73.7%	7	63.6%
	Pollution	21	84.0%	22	81.5%	36	63.2%	4	36.4%
	Air	17	68.0%	17	63.0%	23	40.4%	2	18.2%
	Water	21	84.0%	20	74.1%	32	56.1%	3	27.3%
	Oil	22	88.0%	23	85.2%	45	78.9%	9	81.8%

Table 4.2.2: Responses of non-managerial employees (NME's) from all the target groups regarding environmental training programmes offered to them

	Options	Group: Difference: $\chi = 122.885$, df = 15, p-value <0.001							
		Contractor		Tennant		Transnet		Waste Licence Holder	
		Count	Column %	Count	Column %	Count	Column %	Count	Column %
What type of environmental training programmes did you receive from your company?	Waste	59	75.6%	72	67.9%	68	42.8%	43	61.4%
	Pollution	51	65.4%	65	61.3%	88	55.3%	21	30.0%
	Air	44	56.4%	53	50.0%	49	30.8%	14	20.0%
	Water	51	65.4%	68	64.2%	75	47.2%	20	28.6%
	Oil Spill	64	82.1%	80	75.5%	100	62.9%	52	74.3%

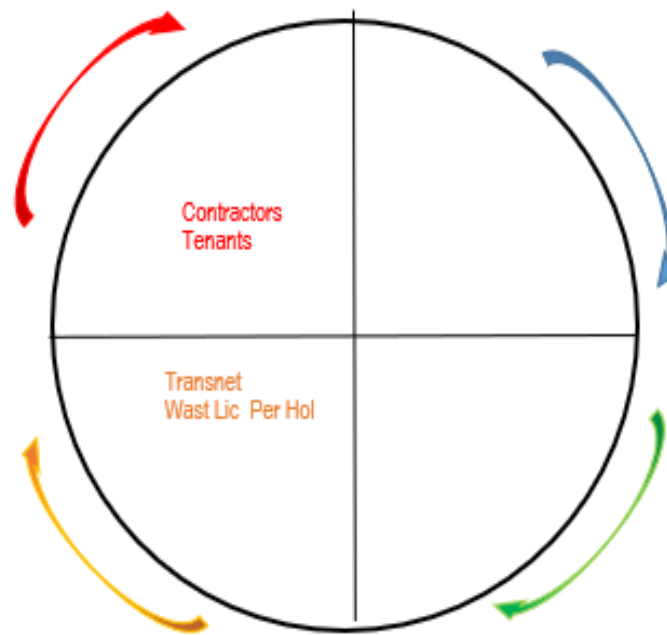


Figure 4.2.1: An illustration of the distribution of the responses from all the target groups from ME's regarding waste environmental training programmes offered to NME's.

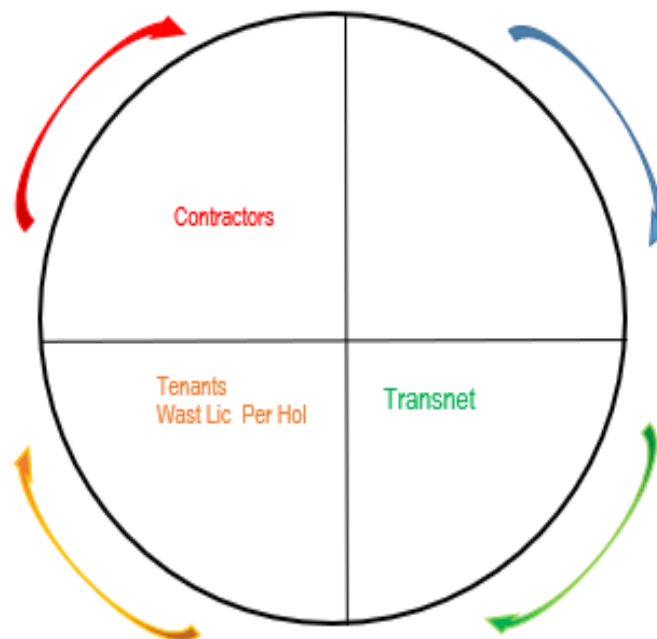


Figure 4.2.2: An illustration of the distribution of the responses from all the target groups from NME's regarding waste environmental training programmes offered to them.

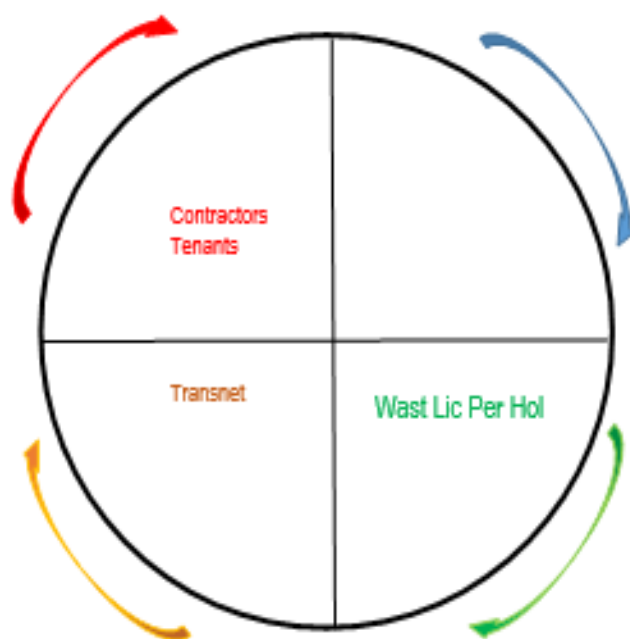


Figure 4.2.3: An illustration of the distribution of the responses from all the target groups from ME's regarding pollution environmental training programmes offered to NME's.

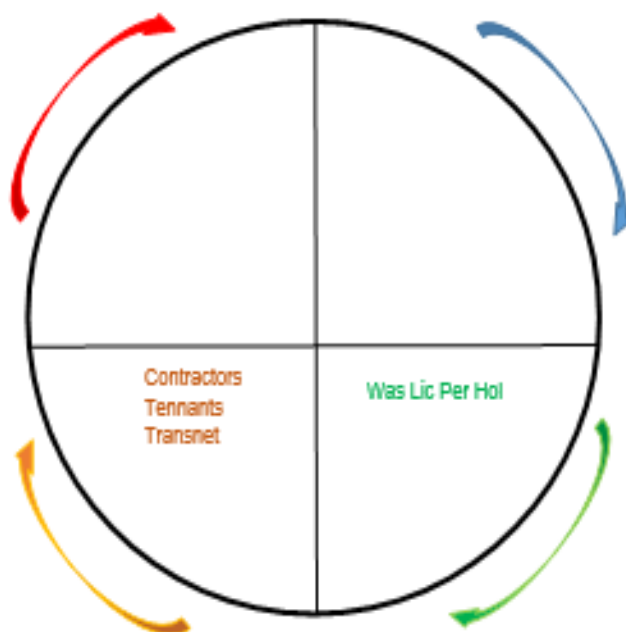


Figure 4.2.4: An illustration of the distribution of the responses from all the target groups from NME's regarding pollution environmental training programmes offered to them.

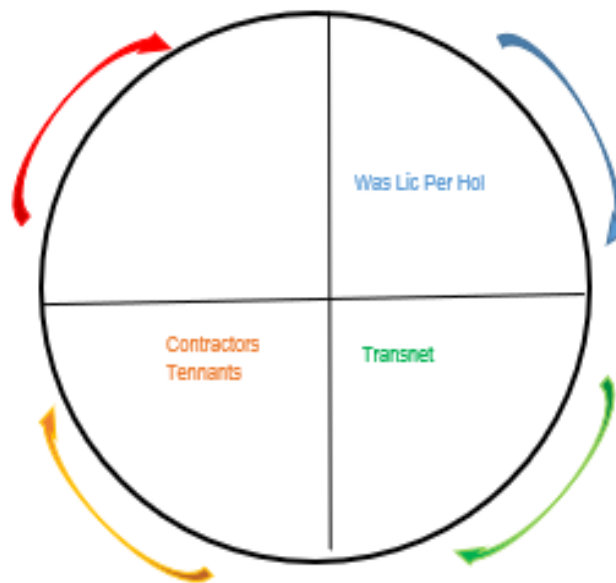


Figure 4.2.5: An illustration of the distribution of the responses from all the target groups from ME's regarding air environmental training programmes offered to NME's.

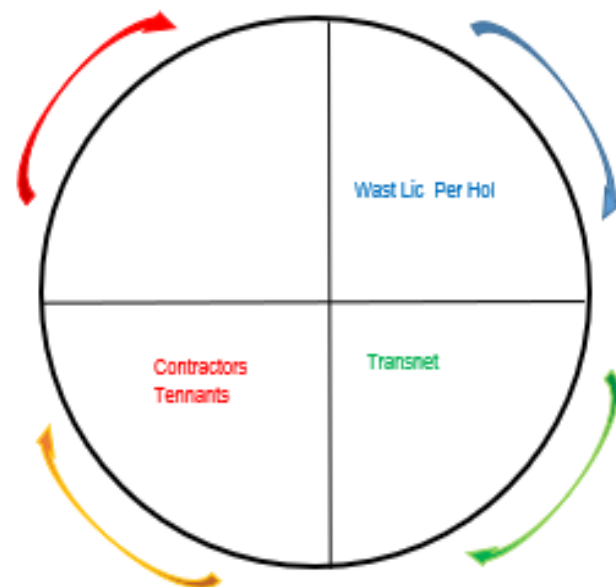


Figure 4.2.6: An illustration of the distribution of the responses from all the target groups from NME's regarding air environmental training programmes offered to them.

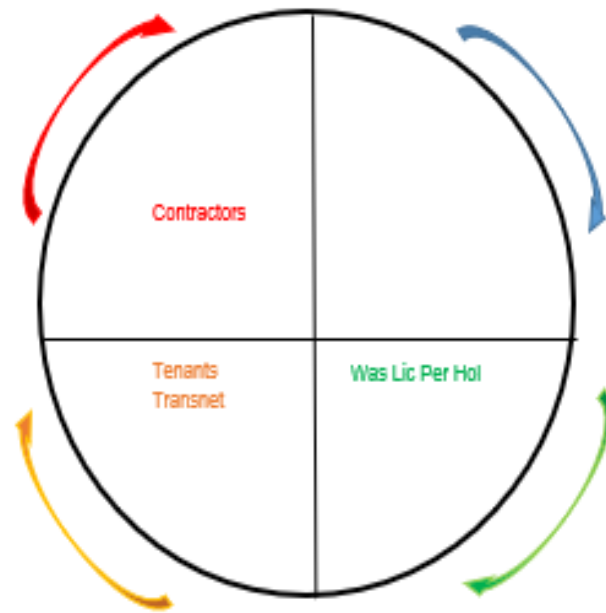


Figure 4.2.7: An illustration of the distribution of the responses from all the target groups from NME's regarding water environmental training programmes offered to them.

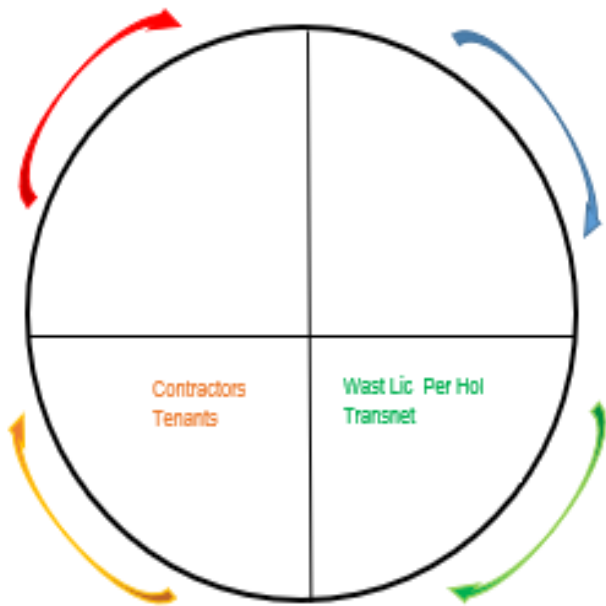


Figure 4.2.8: An illustration of the distribution of the responses from all the target groups from ME's regarding water environmental training programmes offered to NME's.

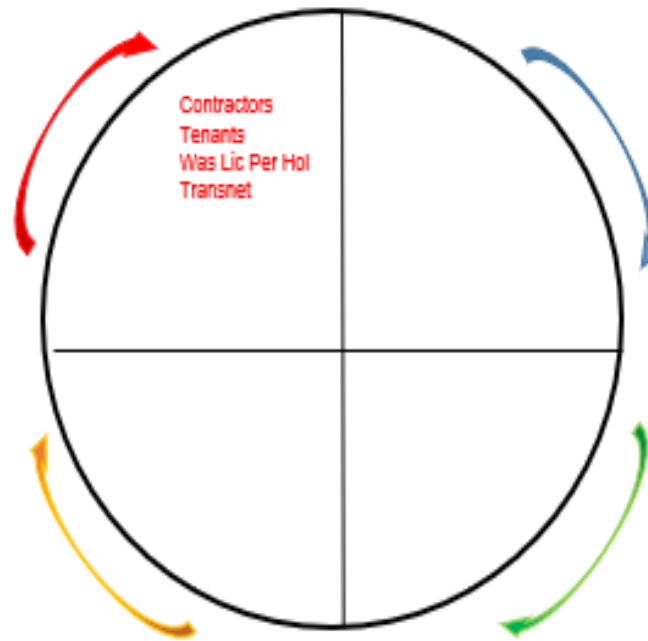


Figure 4.2.9: An illustration of the distribution of the responses from all the target groups from ME's regarding oil environmental training programmes offered to NME's.

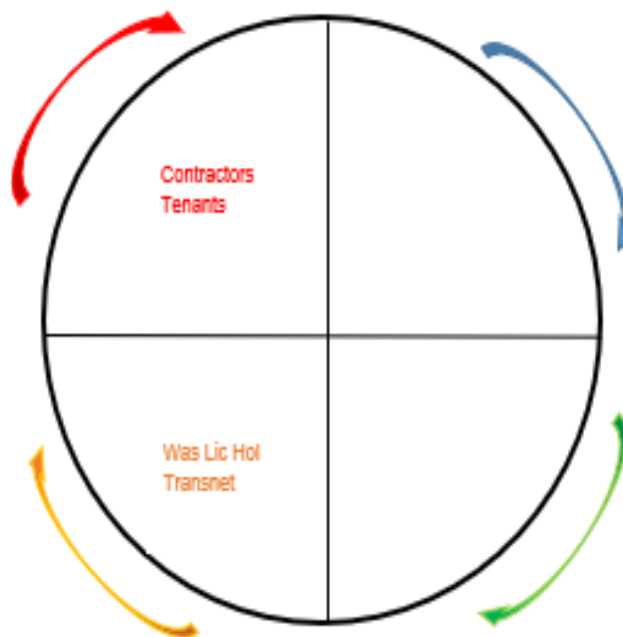


Figure 4.2.10: An illustration of the distribution of the responses from all the target groups from NME's regarding oil environmental training programmes offered to them.

4.2.1 Contractor responses (ME's and NME's) concerning environmental training programmes

There were statistical significant differences within the managerial employees (ME's) and the non-managerial employees (NME's) in terms of the responses regarding environmental training programmes ($P < 0.001$) (Table 4.2.1; Table 4.2.2). Comparisons were made between target groups and training options. The contractors were found to have the highest response percentages for ME's and NME's. Responses ranged from 68% to 96% for ME's and 56.4% to 82.1% for NME's (Table 4.2.1; Table 4.2.2).

The Transnet National Ports Authority (TNPA) has procedures for contractor management that has to be adhered to by all port users (Appendix, B3). Any contractor that performs their work within the port premises is expected to submit a Safety, Health and Environmental Plan (SHEP) to the TNPA Safety, Health, Environment and Quality (SHEQ) department. The TNPA SHEQ department has a staff complement of four Risk Specialists (RS) for the port that evaluate the compliance of the SHEP file in relation to legal requirements. Among other requirements that the RS evaluate in the submission of the SHEP file, is the competency of the personnel of the contractor that is expected to do work in the port (Transnet SOC Ltd, 2019; Appendix C1). Subsection 4 of Section 4 of the Construction Regulation of 2003 stipulates that "no client (in this case TNPA) shall appoint a principal contractor to perform construction work, unless the client is reasonably satisfied that the principal contractor that he or she intends to appoint has necessary competencies and the resources to carry out the work safely" (Republic of South Africa, 2003). Due to this process the contractor is obliged to present a SHEP file that complies with the law, especially in matters that relate to training of the employees. Section 7 of the Construction Regulation of 2014 states that "no contractor may allow or permit any employee or person to enter any site, unless those employees or persons has undergone health and safety induction training pertaining to the hazards prevalent on the site at the time of entry" (Republic of South Africa, 2014).

In line with Section 7 of the Construction Regulation, the RS conduct TNPA safety, health and environmental training programmes to all contractors appointed to do work

for TNPA. The TNPA has developed a Safety, Health and Environment Induction Manual (SHEIM) for all induction training programmes. There are also induction manual (SHEIM) training booklets that are provided to the contractor employees for ease of reference or to read at their own time. These SHEIM training materials (booklets) were created to give an all-inclusive understanding about TNPA's SHE philosophy, which strive towards zero accidents or / and harm to the environment (TNPA, 2015c; Appendix C2).

A copy of the approved SHE files are normally placed onsite where the construction work is carried out. The Department of Labour conducts random inspections on the contractors. All necessary documents related to the SHEP file should always be onsite for inspection purposes. The training certificates and / or attendance registers are also kept on record (Annexure C3). The environmental training qualifications should be kept in the SHEP files and should be updated regularly. Subsections 1(m) and (l) of Section 5 of the Construction Regulation of 2017 indicates that "the client (TNPA) must ensure that a copy of the principal contractor's safety, health and environment plan is available on request to an employee, inspector and contractor; this plan must be implemented and maintained". Furthermore, Subsection 1(o) of Section 5 states that "periodic audits and document verification are to be conducted, at least once every 30 days". Additionally, the TNPA's RS has the right to stop any construction work that threatens people's health and safety and the port environment; this includes any incompetent personnel (Republic of South Africa, 2017). A contractor "must at all times keep on his or her construction site records of the SHE induction training contemplated in Subsection 9 of Section 5 and such records must be made available on request to an inspector, the client (TNPA), the client's agent or the principal contractor" (Republic of South Africa, 2017) (Appendix C4). The random inspections by the DoL add value to the TNPA processes.

The TNPA conducts induction training programmes for employees of contractors in order to ensure that there is compliance to training related matters. However, it was observed that the environmental section in the TNPA SHEIM training programme was inadequate for many years. The observation was by means of document review. The environmental section, including pollution and waste, among others, were found to be inadequate. This gap provides an opportunity to expand the environmental component

in the TNPA induction training programme. Furthermore, it was discovered by means of observations that the contractors occasionally subcontract work. This means that the RS is likely not to evaluate the sub-contractor SHEP file, neither provide induction training to its employees. It is thus possible that the lack of a complete environmental component in the induction training programme of TNPA, and subcontractors not being inducted by the RS, might influence the environmental challenges that are found in the port. According to Ahmad *et al.* (2012) training of the employees has been as important aspect in most organisations in order for employees to act responsibly in relation to the environment, while doing their daily tasks. On some occasions waste and pollution would be left behind by some of the contractors and subcontractor's employees. This could explain a lack of environmental training programme component not reaching all the employees who are subcontracted. Due to this the port environment end up with waste and pollution and this may possibly not be removed and disposed properly in a safe manner.

After identifying these gaps, the researcher immediately initiated a proposal to the relevant managers of the TNPA to include sufficient environmental elements in the Port of Cape Town's induction training and workshop programme for both contractors and subcontractors (Appendix C5). The environmental elements that were expanded upon included waste, pollution and other environmental related elements.

The process the TNPA is using to manage the contractors seems to be effective to some degree although there were gaps identified that needs continuous improvement. The RS, among other requirements, check the environmental training programmes offered to the employees in the SHEP file. Then, the contractor with an approved SHEP file further receives the TNPA induction training programme from the RS. It is, therefore, likely possible that the processes of approval of the SHEP file and induction training programme before contractors access the dry dock have a positive influence on the response percentages recorded from the contractors as far as environmental training programmes are concerned. Therefore, the reason for contractor response percentages being the highest, compared to the other target groups, may be due to the SHEP file requirement, the associated processes and legal requirements. Furthermore, inspections carried by the DoL and the induction training programmes that the contractors' employees have to attend also contributed to the higher response

percentages from the contractor employees. The shortcomings identified in the environmental component of the TNPA training programme is an opportunity for improvement. This study's findings indicate that the contractors provide environmentally related training for its NMEs. However, the induction training programme offered by the TNPA lacks sufficient environmental components, amongst other issues, that deal with waste and pollution management in the port. The TNPA RS and the inspections from the DoL seem to be playing a positive role that influence contractor training responses, by means of regular monitoring.

From here the discussion focusses specifically on the responses of the ME's and NME's in terms of the different types / components (waste, oil spills, pollution, water and air) of environmental training programmes.

4.2.1.1 Waste and oil spill related training

The ME's gave "waste" the highest response percentage (96%), while the NME's gave the highest response percentage to "oil spill" training (82%). The "waste" response percentage (75.6%) for NME's was the second highest. The "oil spill" response percentage (88.0%) was the second highest in the case of ME's (Table 4.2.1; Table 4.2.2).

The contractors provide environmental training programmes to their employees that contain "waste" related matters. According to Transnet SOC Ltd (2017a) contract procedures require the contractor managerial employees to provide a Safety, Health and Environmental Plan (SHEP) file. This SHEP file shows the training programmes and certificates of competence for the employees that will be conducting work on the Transnet site. Within the procedure, docking and undocking compliance forms should be signed by both the contractor manager and the Transnet site manager (Dry Dock Master). These docking and undocking compliance forms indicate readiness of the site to be handed over to the contractor, in conjunction with the training offered to the employees of contractors that is meant to work on the site. The docking and undocking compliance form contains matters to take into consideration before the site handover process is completed to the contractors, such as, management of waste, oil spills, rubble, littering, scrap metal, amongst others (Appendix B9). Due to this process before the site handover, the managerial employee of the contractor must demonstrate

to Transnet that the employees of the contractors were trained on the topics as outlined on the compliance form by providing proof in the SHEP file. In the SHEP file the contractor provides the training matrix and the toolbox topics that will be discussed with the employees before the commencement of the work in the dry docks. The very same compliance form is used before the contractor leaves the premises of Transnet, after the work has come to an end. Should there be any waste left behind on the Transnet premises, the final payment will not be released to the contractor, or the contractor will be subjected to a penalty fee should Transnet use its employees for any environmental clean-up (Transnet SOC Ltd, 2017a). Therefore, it could be possible that the waste training programme that is provided, handover procedures of work sites and the penalty retention fee all contributed to the high response percentage for “waste” training by contractor ME’s and NME’s.

The NME’s gave the highest response percentage (82%) to “oil spill”. According to Broekema (2016) an “oil spill” is a form of pollution caused by human activity and is defined as the release of liquid petroleum hydrocarbons into the environment. This takes place mainly in the marine and coastal environment. However, oil spills can also happen on land. The NME’s receive formal training to help them manage “oil spills” when it occurs. It is one of the requirements that must be adhered to by all contractor employees that works to manage oil spills. The employees’ competency is crucial, since oil spills are regarded as hazardous. The associated training is classified as a hazardous waste training requirement for employees that work on the management oil spills (Republic of South Africa, 1996b). Therefore, handling of oil spills requires formal training conducted by accredited service providers. The service provider must also issue the employees that undergo this training with certificates of competency. These certificates are only valid for a period of 12 months. Therefore, oil spill training will be foremost in the minds of NME’s because they receive it periodically.

Quite often most of the contractors do not have the capacity to handle big oil spills even though their employees receive the appropriate training. The handling and management of oil spill material and equipment for big oil spills are expensive (Fingas, 2012). The majority of the contractors have equipment for relatively small oil spills (Appendix C6). It is not cost effective for a contractor to have all the necessary equipment to handle a big spill, especially if the contractor is going to be on Transnet

property for a short period of time. This reality makes it more sensible for the contractor to have the Port of Cape Town pollution control team or one of the WLPH's as part of their emergency contingency plan, should there be any oil spill during their operations in the port. Contract companies are able to handle smaller oil spills because they provide the required training to their employees. However, contractors rely on the Port of Cape Town pollution control team and / or on selected WLPH's for the management of larger oil spills.

4.2.1.2 Pollution and water related training

Both “pollution” and “water” training programmes received similar response percentages from the ME's and NME's. The ME's response percentage for “pollution” and “water” were the same (84%). The NME's response percentages for “pollution” and “water” were also the same (65.4%) (Table 3.2.1; Table 3.2.2).

Environmental training programmes for both “pollution” and “water” related matter were provided to the employees of the contractors. This training was provided by the SHE specialist of the contractors. In the dry docks there are procedures that must be followed for flooding and unflooding. These procedures are applied in conjunction with the docking and undocking compliance requirements (Appendix B8). Before the dry docks are flooded or unflooded with water in order for vessels to come in for repairs to be conducted by contractors, the ME representatives of the relevant contractors and Transnet ME's (Dock Master) meet to discuss the requirements and documentation needed for the dry dock operations. After relevant documentation submissions and approval of the submission, the site inspection will commence. The dry docks will be inspected for any pollution that could negatively impact the environment during a flooding period. Should there be any pollution which are likely to affect the water quality, such pollutants will be removed and disposed of appropriately. To help in this process, the Port of Cape Town has a water quality monitoring programme in place to investigate water quality in the port (CSIR, 2016a).

In a 2015 winter survey conducted by the CSIR (2016a) water quality in and near the Port of Cape Town was classified as fair at some sampling stations but at most as good or excellent. While, in the summer survey in 2016 water quality was classified as fair to good, and occasionally excellent at some sampling stations. However, water

quality was classified as poor at certain other stations. The most significantly impaired water quality was in the Alfred Basin, where metal concentrations were higher than in other parts of the port. In the Duncan Dock nutrient concentrations and faecal indicator bacteria counts were found to be high (CSIR, 2016a). Another CSIR study was done in 2018. This investigation found that surface water quality across most of the Port of Cape Town in the winter of 2017 and the summer of 2018 could be classified as good or excellent. However, water quality in the Duncan Dock during the winter survey was found to be fair. Similarly, water quality during the summer survey in the Victoria and Alfred Marina, part of Duncan Dock, the Entrance Basin, and at a position in the marine environment were classified as fair as well (CSIR, 2018). The water quality index of the CSIR study published in 2018 suggests an improvement compared to the previous investigation by the CSIR that was published in 2016. According to Corcoran *et al.* (2010), collaboration and sharing of information and policies This is important for continuous improvement of water quality. The water quality results are shared by Transnet with contractors in different platforms and as part of environmental training programmes. This practice may have contributed to the improved water quality in the port between the 2016 and the 2018 CSIR investigations.

There are sufficient environmental training programmes in the maritime sector that are developed by the International Maritime Organisation (IMO) for employees to gain the necessary skills and knowledge when working in the port environments (IMO, 2016). In the Port of Cape Town “water” and “pollution” training was sufficiently provided by the contractors to both ME’s and NME’s. Furthermore, the control measures that both ME’s and NME’s are implementing from the side of contractors and Transnet, as the client, seems to have helped to improve water quality in the port environment in recent years. In the context of this study, “pollution” and “water” training probably means the same thing, hence similar response percentages. It can be concluded that environmental training and application of procedures are important for both ME’s and NME’s as far as pollution and water is concerned.

4.2.1.3 Air pollution related training

Air pollution response percentages from contractor ME’s and NME’s were found to be the lowest (68% and 56%, respectively) in comparison to the other options (Table 4.2.1; Table 4.2.2).

ME and NME response percentages were relatively similar to each other. Air pollution training is provided to ME's and NME's of contractors by their own SHE specialist. Certain ship repair activities trigger localised air pollution. However, it should be noted that the air pollution that is referred to here is not continuous but only present while certain ship repair activities take place. For instance, in the dry docks the contractors are from time to time engaged in vessel cutting processes (Appendix B25). During the vessel cutting process fumes are emitted for a short period of time. However, the air clears up soon after this activity stops. The City of Cape Town does have an air quality monitoring station, which is approximately 1 km from the Synchrolift dry dock, where vessel cutting usually takes place. However, at the time of data collection for this study, no air quality monitoring took place in the port. It should be noted that the International Association for Ports and Harbours (IAPH) indicated that air emissions from maritime activities are increasing and will continue doing so if no action is taken (IAHP, 2010 & 2014). Therefore, air quality monitoring must be established in the port to investigate and manage possible unacceptable air quality that may be caused by activities in the port.

An air emissions inventory was compiled for the Port of Cape Town in 2016. The sources of air emissions include ocean-going vessels (OGV), harbour craft and motor vehicles. The emissions inventory included contaminants such as, SO₂, NO_x, PM₁₀, PM_{2.5}, CO and VOC's. The inventory also included two greenhouse gases, CO₂ and CH₄. Ocean-going vessels exceeded the contribution of all other air emission sources. The 2016 inventory done by uMoya-NILU found that air pollution is a problem in the Port of Cape Town (uMoya-NILU, 2016a). Further investigations by uMoya-NILU (2016b) revealed that there were no working air emissions monitoring stations to measure air pollutants from the operational activities in the dry docks of the Port of Cape Town. This violates the Occupational Health and Safety Act no. 85 of 1993 that states that any person who enters a workplace premises must be made aware of the risk of such an environment (Republic of South Africa, 1993). In the absence of air quality monitoring in the port, Transnet is not able to make employees of contractors aware of air quality risks. Furthermore, this Act requires that training be provided to individuals working in such an environment (Republic of South Africa, 1993). The fact that the response percentages from contractor ME's and NME's are the lowest

compared to other training options is an indication that air pollution training is of a lower priority in the Port of Cape Town.

It is recommended that an air pollution training programme be given greater priority and provided to employees by contractors and Transnet or by external accredited service providers. Operational air quality monitoring stations should also be installed in strategic positions on the premises of the port. Reports generated from the results of these monitoring stations should also be shared with contractors in compliance with the Occupational Health and Safety Act (Republic of South Africa, 1993).

4.2.2 Tenant responses (ME and NME's) concerning environmental training programmes

There were statistical significant differences within the managerial employees (ME's) and the non-managerial employees (NME's) in terms of the responses regarding environmental training programmes ($P < 0.001$) (Table 4.2.1; Table 4.2.2). The tenants' response percentages were generally found to be the second highest of all the target groups in this study in terms of environmental training programmes (63.0 to 92.6% from ME's and 50.0 to 75.5% from NME's) (Table 4.2.1; Table 4.2.2).

The National Ports Act (No. 12 of 2005) (hereafter "the Act") stipulates the TNPA functions in Section 11 (1) of the Act as "own, manage, control and administer ports to ensure their efficient and economic functioning, and in doing so the authority (in this case TNPA) must administer, (i) Section 11(1)(c) – control land use within the ports with the power to lease land under such conditions as the authority may determine, (ii) Section 11(1)(f) – maintain the sustainability of the ports and their surroundings, (iii) Section 11(1)(g) regulate and control- (vi) pollution and protection of environment within port limits;(vii) the enhancement of safety and security within the port limits". Additionally, Section 56 (2) of the Act "gives powers to the Authority (in this case TNPA) to monitor and annually review performance of the operation of the terminal and facilities and the provision of the relevant services in terms of performance standard specified in the agreement and the competency of the employees in those operations" (Republic of South Africa, 2005). At the time of this study, there were 121 tenants in the Port of Cape Town (see tenant sampling procedure heading 2.9.3).

The TNPA SHEQ department plays an oversight role in terms of tenants by conducting annual audits and SHE training inductions (Transnet SOC Ltd, 2019; TNPA, 2015c&e; Appendix C2). The SHEQ department has two Environmental Specialists (ES's). Between these two ES's, one conducts annual audits of the tenants, while the other ES conducts audits of the Waste Licence Permit Holders. Besides these oversight audits, both ES's have other responsibilities in the port. The ES responsible for the oversight audits of tenants also must verify the environmental training programmes offered to the employees of tenants.

The training certificates of the employees are normally filed for record purposes by the tenants (Appendix C1). Additionally, attendance registers are kept and filed for all environmental training programmes conducted. In instances where the training certificates or records are not available during an audit by an ES, non-conformance notices are issued to the tenant (Appendix B11). The ES can only conduct ten to fifteen audits in a year out of the total of 121 tenants. The audit schedule and reports indicate that not all the tenants are audited by the ES due to inadequate time and shortage of staff in the TNPA SHEQ department. However, despite this challenge the response percentages suggest that environmental training programmes are offered to a reasonable degree to the employees of tenants.

Unlike contractors that can only access the port with an approved SHEP file to do work in the port for a short period, current tenants already gained access to the port some years ago, and maybe, even without any strict rules with regards to environmental training programmes for their employees. Some tenants have 5 to-10-year lease agreements with the TNPA, while others may have 20 to 25-year lease agreements (Appendix C7). The process of oversight only started towards the end of 2013, while the majority of the leases were signed already some years before. Due to this it is possible that some tenants may have neglected environmental training programmes for their employees until a few years ago when audits by Environmental Specialists (ES's) of the TNPA became part of its oversight function. However, it must also be noted that some of the tenants may have had environmental training programmes in place before audits was initiated by Transnet. This suggestion is supported by the relatively high response percentages recorded from the ME's and NME's of tenants. It must be noted though that it is very difficult for the ES's of Transnet to do a sufficient

number of audits per year on environmental training programmes offered by tenants to their employees, to develop a true picture of the presence, absence or quality of such training programmes. This is due to the availability of only one ES to audit all 121 tenants.

It is recommended that the number of ES's in the TNPA SHEQ department be increased to enable this department to make a meaningful contribution to the auditing, assessment and promotion of environmental training programmes. Future lease agreements of tenants should also be reviewed, and it should be compulsory that tenants comply to environmental training requirements, much like those for contractors.

From here the discussion focusses specifically on the responses of the ME's and NME's in terms of the different types / components (waste, oil spills, pollution, water and air) of environmental training programmes.

4.2.2.1 Waste and oil spill related training

The ME's gave the highest response percentages for "waste" environmental training programmes (92.6%). However, in the case of NME's "oil spill" environmental training programmes (75.5%) received the highest response percentages (Table 4.2.1; Table 4.2.2). These results received from tenants indicate a similar tendency as in the case of contractors (Table 4.2.1; Table 4.2.2).

Although the time spent in the port for their activities differ by years, the contractors and tenants clearly both prioritise "waste" and "oil spill" related training. This could be due to the types of activities contractors and tenants undertake in the port, and the priorities of the TNPA.

According to Section 56 of the National Ports Act (No. 12 of 2005), tenants must sign lease agreements with the TNPA. These lease agreements require, amongst other matters, the tenants to submit environmental management plans. Tenants should also demonstrate how they will manage waste and the mechanisms they will use to dispose of waste at landfill sites (DEA, 2014a; Republic of South Africa, 2005). The environmental management plan must demonstrate how waste will be minimised for

disposal. In certain cases, waste is collected by TNPA contract service providers as a lease agreement service to tenants (TNPA, 2015a; 2020a). The waste collected by Transnet contract service providers from tenants is only general waste. Other types of waste that require specialised disposal is the responsibility of the tenant. They should make the necessary arrangements with WLPH's that operate in the port. The different types of waste should be segregated by the tenants for collection by the different service providers. Due to these processes, the ME's of tenants ensure that their NME's receive "waste" related training, which is more often an informal in-house programme. Records of these training programmes are kept by the tenants for audit purposes. It is thus not surprising that the response percentage for "waste" related training programmes that was recorded for tenant ME's was high.

The NME's gave the highest response percentage of 75.5% for "oil spill" training programmes. Since it is the responsibility of the employer to provide training to their employees (Republic of South Africa, 1993), the ME's of tenants provide "oil spill" and related training to their NME's by means of formal training programmes. The training programme that the NME's are exposed to are accredited and valid for twelve months. It should be noted that as much as all training programmes are free to the employee's majority of those training programmes are offered by the organisation's specialists, without any accredited certificates (In-house training) (EMD, 2014; Naidoo, 2015; TNPA, 2015a; TNPA, 2015c; DCD Dorbyl Marine Cape Town (Pty) Ltd, 2015c; Swift Tank and Oil Solution, 2019). However, oil spills training programmes are considered as specialised training offered by accredited external service providers. This certificate has an advantage for NME's in terms of job opportunities, especially in the port environment or maritime discipline, unlike other internal training offered by organisations. The certificates for oil spill training are filed as proof that the training took place and as evidence for audits conducted by the ES of TNPA.

In terms of Section 62 of the National Ports Act (No. 12 of 2005), the duties that the tenants must comply with, among others is to be compliant to environmental laws and regulations. It is one of the obligations of tenants to inform the authority (in this case Transnet) within 24 hours of any occurrence or discovery of: - (i) any spillage or pollution that may have an impact on the environment; the authority will insist on compliance with all the requirements by existing tenants and will not hesitate to take

necessary steps to suspend or cancel a licence in respect of serious or repeated transgressions (Republic of South Africa, 2005). This requirement of Section 62 is a contributing factor in keeping tenants accountable towards environmental protection. This helps to explain why “oil spill” training programmes have such high priority for tenants, as shown by the response percentages.

4.2.2.2 Pollution and water related training

The ME’s response percentage for “pollution” related training was 81.5%, while that for “water” related training was slightly lower at 74.1%. The NME’s response percentage for “pollution” related training was 61.3%, while that for “water” related training was 64.2% (Table 4.2.1; Table 4.2.2).

The tenants use toolbox sessions for “water” and “pollution” training programmes. These are morning sessions where ME’s and NME’s discuss the operational activities of that day and the risks that are associated with those activities. Mitigation measures are also discussed in these sessions. Annual audits are conducted by the ES of TNPA to verify the level of compliance in terms of “water” and “pollution” training programmes as well as the implementation of those programmes as per the EMP submissions.

In terms of Section 62(5) of the National Ports Act (No. 12 of 2005), it is the responsibility of the tenant to report any occurrence or discovery to the authority (in this case Transnet) of any pollution that may be detrimental to the environment. Failure to comply with the requirements of this Section may result in negative consequences for the tenant involved (Republic of South Africa, 2005). The submission of EMP’s by the tenants to Transnet must also indicate the management of “water” and “pollution” issues with evidence of training provided to the employees. Furthermore, in terms of Section 63(1) of the National Ports Act (No. 12 of 2005) Transnet may conduct routine inspections at any given time and may request any documentation (Republic of South Africa, 2005). Due to the above-mentioned requirements that are in place for the effective management of the leased properties within the port, the tenants ME’s normally comply in the provision of “water” and “pollution” training programmes.

4.2.2.3 Air pollution related training

“Air pollution” related training programmes received the lowest response percentages from tenant ME’s and NME’s, compared to other types of training programmes (63 and 75.5% respectively) (Table 4.2.1; Table 4.2.2).

At the time of data collection, there were 18 tenants that operated listed activities (uMoya-NILU, 2016c) in the Port of Cape Town. A listed activity in terms of the National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM: AQA), category 2, sub-category 2.4, is the storage and handling of petroleum products at facilities with a storage capacity of more 1 000 m³ (DEA, 2013). These listed activities are all liquid bulk activities, mainly associated with the storage and handling of petrochemical products (Sub-Category 2.41), apart from the Cape Town Coal Terminal, where coal is stored and handled (Sub-Category 5.11).

In an investigation conducted by uMoya-NILU (2016c) the following challenges as far as air pollution is concerned in the Port of Cape Town were found: (i) the tenants operating listed activities do not report emissions to TNPA; (ii) the emissions inventory for listed activities in the port was also incomplete; (iii) the tenants in the bulk fuel storage terminal monitor Volatile Organic Compounds (VOC) on their respective fence lines in terms of their Air Emissions Licence (AEL’s), however, the monitoring data from the tenants are not reported to TNPA; (iv) ambient air quality monitoring was not done by TNPA, resulting in an inability to proactively manage air quality; (v) other tenants were not compliant as far as air pollution requirements is concerned, and; (vi) TNPA could not track their tenants’ compliance to NEM: AQA requirements.

There was no information with regards to the tenants’ vehicle emission levels. A tenant assessment report compiled by the provincial government, found that tenant mitigation measures for fugitive emissions were in place by means of the use of vacuum / pressure breaks. In terms of other controls, environmental management procedures for filling and offloading event emissions, were limited. However, the requirements of air emissions licence conditions were met in term of monitoring (DEA&DP, 2014).

To a degree it is concerning that “air pollution” related training programmes is partially addressed by tenants, as evident in the relatively low response percentages from

tenant ME's and NME's. In a study which was conducted in 2000 in South Africa, it was found that air pollution is one of the major environmental problems, which had a very limited available information (Norman *et al.*, 2007). There was a need to improve the identified air pollution challenges, among others from the outdated legislations and policies, inadequate training, increasing air pollution etc (Naiker *et al.*, 2012; Thomas 2002). The legislation developments and training programmes necessitate a change. With these improvements made, there has been some gradual improvements noticed in various challenges which impacted negatively to air pollution in the past. In the study which was conducted from 2010 – 2021 with the purpose to provide an overview of research performance, trends and evolution in the field of ambient air quality monitoring and management in South Africa. Matandirotya, (2021) stipulates that a steady increase in monitoring of ambient air quality and management publications per year. An increase of publications under review, contributed 14% in 2014 to an increase of 27 % in 2020 of the total publications. Furthermore, extensive collaborations of South African scientists with other countries like Finland, France, United States of America, Switzerland in sharing knowledge and conducting workshops, training programmes and seminars. An increase in studies, the more information is to be used in policies formulations and development. Several strategies were put in place by the South African National government to reduce emissions. For instance, enactment of ambient air quality guidelines the number of ambient air quality monitoring. To sum up, although these efforts are put in place for improvement for air pollution, there seems not much is taking place in the port especially tenant as far as air pollution is concerned, there is a need for a direct deliberate focus for training programmes. Furthermore, it seems as if Transnet as the landlord is not doing enough in following up with tenant implementation of EMPs, except when doing audits once a year. Among other focus areas on of the EMP's guidelines for tenants, training programmes is one of the mandatory requirements to appear in their EMP's submissions to TNPA (TNPA, 2010b; TNPA, 2023). The competent authority (Local Authority) should also verify if the submitted documents from industries (in this case tenant) comply with their submissions. It also appears as if the authority (Local Authority) that issues the air permits do not regularly inspections on tenants if the conditions of air emissions licence are adhered to, of which training for competent employees is one of the criteria to be verified based on the submissions to competent authority. As the results of these possible short falls, hence the response rate.

4.2.3 Transnet National Ports Authority responses (ME and NME's) concerning environmental training programmes

There were statistical significant differences within the managerial employees (ME's) and the non-managerial employees (NME's) in terms of the responses regarding environmental training programmes ($P < 0.001$) (Table 4.2.1; Table 4.2.2).

TNPA ranked third in terms of response percentages (40.4 to 78.9% for ME's and 30.8 to 62.9 % NME's) compared to the other target groups (Table 4.2.1; Table 4.2.2). In 2012 Transnet has implemented a Market Demand Strategy. The strategy is to achieve particular company objectives and financial targets. This strategy was implemented in different phases over several years. In August 2014 Transnet top management realised that the financial target for that financial year was likely not to be achieved. Consequently, Transnet top management introduced cost savings initiatives. Part of the measures included a financial moratorium (Appendix B12.1).

Initially the moratorium was set as a short-term control recovery strategy. A communication about this initiative was sent to the entire Transnet and its various divisions, including the TNPA. The following were stated in the moratorium document of 2014 regarding cost savings (Transnet SOC Ltd, 2014). Section 6.1 on professional fees stated that: (i) "no further external consultants shall be appointed for the remainder of the financial year as it relates to non-operational expenditure" (Transnet SOC Ltd, 2015b; Appendix B12.2). A similar moratorium process was repeated in 2015, even with stricter conditions than in the previous year. The conditions stated that "each department is required to evaluate the use of all external consultants with a view to terminate their services where internal resources exist" (TNPA, 2018e; Appendix B12.3). The moratorium of 2015 did not even indicate an end period but rather stated "until further notice". From 2016 to 2018 the moratorium continued as a means of saving costs (Transnet SOC Ltd, 2018a; Appendix B12.4). In all these it should be taken into consideration that the TNPA, Port of Cape Town has a training department that only administers training but does not offer environmental training programmes themselves. TNPA-Port of Cape Town is relying on external consultants for environmental investigations and the roll out of environmental training programmes (TNPA, 2022a; TNPA, 2022b)

The freeze in the using external consultants for training purposes has certain implications. At national and international level there has been many changes taking place concerning environmental systems and legislations. The change in environmental management system (EMS) from 14001:2004 to a new system of 14001:2015 requires the organisation to train individuals to understand the requirements of the system. At national level the 2014 amendment of the Waste Act of 2008, as far as waste and pollution is concerned, requires individuals to be trained, especially those who handle waste. The port must be operated and maintained in accordance with the requirements of the ISO 14001 EMS. This EMS is an important tool to use to ensure that the port systematically monitors and identifies areas where possible environmental risks occur. A fundamental part of the EMS is addressing these risks through mitigation measures that will reduce or eliminate the impacts continuously and, in the process, protect the environment. The process requires competency of the individuals who are responsible for the implementation of the EMS (Emilsson & Hjelm, 2002; Delmas, 2000). Furthermore, this EMS also requires regular internal audits against the requirements of the ISO 14001 system, as well as the assessment of compliance to applicable legislations (de Oliveira *et al.*, 2017).

The objective of the Waste Act of 2008, amongst others, is to protect the environment by providing reasonable measures for: (i) “avoiding and minimising the generation of waste; (ii) preventing pollution and ecological degradation; (iii) promoting and ensuring the effective delivery of waste services; (iv) remediating land where contamination presents or may present a significant risk of harm to health or the environment” (Republic of South Africa, 2008a). Compliance from the side of TNPA to legislative and environmental management system requirements consequently becomes a priority. For these tools to work appropriately training of key personnel in an organisation like the TNPA becomes crucial so that they are able to train the rest of the employees in ISO systems and in legal requirements. The institutions of higher education, through short courses, offer both environmental training programmes that addresses ISO systems and the associated legislative requirements. Some of the institutions of higher education that offer these environmental training programmes are outside the province where the Port of Cape Town is situated. These short courses offer opportunities to all the different levels of employees of TNPA to enable them to function effectively within the legislative and EMS requirements. In order for the Port of Cape Town TNPA employees to attend these short courses travel and

accommodation cost as well as registration fees are required. This is where the terms of the financial moratorium become stumbling blocks. The moratorium under Section 6.2 (travel and accommodation) indicates that: (i) “local travel and accommodation shall cease with immediate effect, unless authorised by the relevant Group Exco member” (Transnet SOC Ltd, 2015b). For TNPA employees who may need to be supported by the employer to attend these short courses, the moratorium becomes a barrier. Before the application forms to attend a training, short course reaches the group executive committee member, the immediate supervisor of the applying employees may decline the applications in order to save costs as per the moratorium requirement. The applications of those employees will likely not reach the Group Exco member. The problem is that supervisors and managers are rewarded if they reach financial savings targets in accordance with the moratorium. Due to this, there is a significant possibility that supervisors and managers would decline funding applications for training from employees. According to Junnila (2007) the employees’ views in the workplace are slow to gain the attention it deserves in an organisation. It is necessary for everyone in the organisation to be involved, well trained and competent in the ISO 14001 EMS programme for the organisation to improve the management of waste and pollution (Fei-Baffoe *et al.*, 2013). Here seems to be conflict between the need to save money for TNPA and the need to enable appropriate levels of training of employees.

Section 6.3 of the moratorium on training states that “training shall be limited to operational and technical training only”. Transnet has an integrated policy on safety, health, environment and quality (SHEQ) (Transnet SOC Ltd, 2017b; Appendix B13). The custodian of this policy is the Safety, Health and Environment Department of TNPA. This policy indicates that all employees should have equal opportunities for training and development. However, the financial moratorium contradicts the intention of the SHEQ policy. Furthermore, the company has embarked on a new holistic Transnet Integrated Management Approach (TIMA) (Transnet SOC Ltd, 2017c; Appendix B14). In order to effectively implement TIMA, training programmes should include safety, health and environmental aspects. However, the financial moratorium is hindering TIMA from being effectively implemented because the required training cannot take place.

The Occupational Health and Safety Act (No. 85 of 1993) states a contrast with the principle of the moratorium. Section 8(2)(e) of the Act stipulates that the employer shall provide information, instruction, training and supervision to its employees (Republic of South Africa, 1993). Furthermore, the environmental and hazardous chemical substances regulations for workplaces of this Act under Section 3 (information and training) indicates that “an employer shall, before any employee is exposed or may be exposed to any work activity of the workplace, the employee is adequately and comprehensively informed and trained”. The Act does not regard environmental training programmes as less important than the other training programmes as it is the case with the Transnet financial moratorium, where certain types of training is given preference over others.

According to the Skills Development Act (No. 97 of 1998), the workplace is an environment where employees’ skills are sharpened, and new ideas developed because the organisation is investing in their employees by offering relevant training programmes for personal development. This development will eventually benefit the organisation (RSA, 1998d). This Act is focussed on rectifying the injustice done to previously disadvantaged communities in South Africa due to “apartheid” that prevented the majority of the country’s people to improve their skills in their areas of interest. The development and training of individuals should be respected and will in the process promote a conducive workplace environment. It is therefore recommended that there should be reasonable management measures put in place that will enhance the training of TNPA employees in order to ensure that legislative and EMS requirements are met.

From here the discussion focusses on the responses of the ME’s and NME’s in terms of the different types / components (waste, pollution, air, water and oil spill) of environmental training programmes.

4.2.3.1 Waste and oil spill related training

The ME’s response percentage regarding “waste” training in Transnet was 73.7%, while those of the NME’s were 42.8% (Table 4.2.1; Table 4.2.2).

The port has two ES's in its SHEQ department. The environmental service for the entire port is shared among these two ES's. Between them, one deals with waste matters. Due to a shortage of human resources (including the vacant Pollution Control Officer position) the ES responsible for waste matters are often unable to effectively deal with waste related inhouse training because other matters of responsibility must also be dealt with. Therefore, waste inhouse training programmes are only partially offered by Transnet to its NME's by the ES.

According to Section 74 of the National Ports Act the Harbour Master's office is responsible for waste management, especially with regards to vessels that report to the ports (Republic of South Africa, 2005). The position of the Pollution Control Officer (PCO) is in the structure of the Harbour Master Department. Consequently, training programmes that deal with waste and the management thereof is supposed to be offered from the Harbour Master's department. However, the position of the PCO has been vacant for several years. The Port of Cape Town has an approved Integrated Waste Management Plan (IWMP). This plan stipulates that waste management is part of the function of the PCO (TNPA, 2015a & 2020a). The Transnet SHEQ policy requires all its employees to be trained as far as SHE is concerned (Transnet SOC Ltd, 2017b). This policy further states that Transnet will provide the resources where necessary to ensure that the operations are conducted in a safe way, while being compliant to all the legal requirements. Due to the resources that are lacking, the roles and responsibilities of TNPA personnel cannot necessarily be effectively fulfilled. In this manner the "waste" training programmes that is meant to be rolled out to the NME's is compromised. The low response percentage (42.8%) from the NME's seems to be a product of a lack of waste related training taking place in Transnet.

The ME's (78.9%) and NME's (62.9%) response percentages for "oil spill" training programmes, are the highest response percentages recorded from the Transnet target group (Table 4.2.1; Table 4.2.2). The Port of Cape Town has an oil spill contingency plan (TNPA, 2019a). The Harbour Master's office is responsible for the improvement and updating of this plan. Furthermore, it is the responsibility of this office to ensure that Transnet's state of readiness to appropriately manage oil spill incidents within the port is maintained. The Pollution Control Officer (PCO) is meant to be responsible for ensuring that oil spill training is offered to all those individuals who are involved in

carrying out the oil spill contingency plan. However, as previously pointed out the PCO position has been vacant for a number of years already. In spite of this it, Transnet still ensures that exercises and simulations are carrying out to prepare for possible oil spill incidences (TNPA, 2019a). When there are oil spill incidents in the port, it must be reported to both South African Maritime Safety Authority (SAMSA) and Department of Environmental Affairs (DEA) (SAMSA, 2007). In terms of Article 8 and Protocol I of MARPOL 73/78, which establishes the reporting requirements for pollution incidents, the protocol indicates that the reports should contain as much information as possible concerning oil spill management (MARPOL, 1973). The above could have contributed to the response percentages of Transnet NME's and ME's since training in the form of exercises and simulations are carried out. This is so because the risk of oil spills taking place is a significant threat in the port environment (TNPA, 2019a).

4.2.3.2 Pollution and water related training

The response percentages of ME's and NME's were similar. The ME's response percentage for "pollution" related training was 63.2%, while that for "water" related training was 56.1%. The NME's response percentage for "pollution" related training was 55.3%, while their response percentage for "water" related training was 47.2% (Table 4.2.1; Table 4.2.2).

The integrated management system (IMS) compliance policy states that the leadership of Transnet acknowledges its obligation to provide and maintain a working environment to the employees, public, assets and the environment that is not harmful. The philosophy is based on the principle of the prevention of occurrences of incidents and accountability for those occurrences. This philosophy applies to all employees of Transnet (Transnet SOC Ltd, 2017b&c). It is an expectation that all employees should have knowledge, experience and training that are specific to their duties which they have been appointed to supervise, to carry out and / or control (TNPA, 2015b&d). The policy objective requires the prevention or at least the reduction of environmental pollution occurrences. This can be achieved by the provision of appropriate environmental training programmes, among other preventative measures (Transnet SOC Ltd, 2017b).

According to the Transnet Capital Project (TCP) (2018) the approved standard environmental management plan for the Port of Cape Town indicates that environmental training programmes are targeted at managerial and non-managerial employees. The environmental training programmes are formulated for these levels and should comprise of the following: (i) a record of all names, positions and duties of staff to be trained; (ii) a framework for the training programmes; (iii) a summarised version of the training course(s); and (iv) an agenda for the delivery of the training courses. Such programmes will set out the training requirements which need to be conducted, prior to the commencement of any work within the port. Additionally, should there be any environmental aspects that are unclear to the employees, the Environmental Officer (EO) from the TNPA may be requested to provide additional training onsite (TCP, 2018). Due to a lack of human resources (as reported earlier) at the Port of Cape Town, the provision of environmental training is not at the level where it should be. This amongst other factors, may have contributed to the relatively low response percentages that was reported by the ME's and NME's for "pollution" and "water" training programmes.

4.2.3.3 Air pollution related training

The response percentages for the ME's (40.4%) and NME's (30.8%) are lower relative to other response percentages within Transnet and other target groups (Table 4.2.1; Table 4.2.2).

There were no air pollution training programmes scheduled for employees (ME's and NME's) during the time of data collection for this study (uMoya-NILU (2016c). According to uMoya-NILU (2016c) the role of TNPA in air quality management in the Port of Cape Town was not properly understood among internal and external stakeholders. uMoya-NILU (2016c) also found that the engagement of internal and external stakeholders regarding air quality was relatively poor. This study that was commissioned by Transnet to uMoya-NILU (2016a) indicated that air quality in the Port of Cape Town was very poor without a clear management plan or training programme. Furthermore, that study indicated that the Port of Cape Town has limited air quality management competence and capacity. This is corroborated by the low response percentages from Transnet ME's and NME's for "air pollution" training. Similar results were found for contractors in heading 4.2.1 and tables 4.2.1 - 2.

It can be concluded that there seems to be a lack of air pollution training programmes that is offered in the Port of Cape Town. In the light of TNPA's oversight role (as indicated in Section 11 of the National Ports Act), as landlord of the port users, there is an obligation to influence the users to be legally compliant regarding air quality management (Republic of South Africa, 2005). For compliance with legislation, the TNPA is also responsible for regulating all operations. Transnet's own policy on SHEQ requires it to influence port users to be legally compliant and provide appropriate training to employees (Transnet SOC Ltd, 2020). South Africa is a signatory to the MARPOL convention. The International Convention for Prevention of Pollution from Ships (1973 and its 1978) protocol, which became effective on October 2, 1983, "is an international response to the threat of contamination of the marine environment" (MARPOL 73/78; MARPOL, 1973). There are benefits for the Port of Cape Town to implement MARPOL regulations. One of these benefits is the reduction of emissions from operational activities in the port. Vissers (2010) stressed that air pollution and its health impacts must be understood. This can be done by providing effective air pollution training programmes to employees of Transnet in the Port of Cape Town.

4.2.4 Waste Licence Permit Holder (WLPH) responses (MEs and NME's) concerning environmental training programmes

There were statistical significant differences within the managerial employees (ME's) and the non-manual employees (NME's) in terms of the responses regarding environmental training programmes ($P < 0.001$) (Table 4.2.1; Table 4.2.2).

The WLPH's response percentages of 18.2 to 63.6% for ME's and 20.0 to 61.4% for NME's loosely corresponds with each other (Table 4.2.1; Table 4.2.2). Section 56(2) of the National Ports Act (No. 12 of 2005) gives powers to the authority (in this case TNPA) to monitor and annually review performance of the operation of the terminal, the facilities, and the provision of relevant services in terms of performance standards specified in the agreement and the competency of the employees in those operations (Republic of South Africa, 2005). Furthermore, licence conditions states that "only employees with the applicable training required by the relevant legislation may be utilised by the licensee." Training records must be made available to TNPA upon request (TNPA, 2011). Section 56(2) requires any organisation that want to provide services in the waste sector within the port environment to apply for a waste permit

with TNPA. Part of the approval criteria requires evidence of environmental training programmes (Appendix B15). Once the application form is approved, the WLPs may operate within the port for a period of five years. The applicant may reapply for a new permit before it expires. TNPA personnel conduct the oversight audits on a yearly basis for the period of five years or as long as the licence is active.

The TNPA SHEQ department plays the oversight role over the WLPs by conducting annual audits and SHE induction training (Appendix C2). An ES that is part of the SHEQ department is responsible for the yearly audits of WLPs. However, this ES also has other responsibilities in the port besides the oversight over WLPs. Part of the WLP oversight functions of the ES is to verify the environmental training programmes offered to the employees of WLPs. The TNPA audit protocol requires the WLPs to keep all training certificates and training matrices of the employees (Appendix C1). The WLPs are not located on the premises of the port on a permanent basis. They only come to the port premises for collection of waste that must be disposed. Even though they are not located in the port, they must still adhere to the TNPA requirements. The ES can issue non-conformance notices where environmental training records cannot be provided by the WLPs for audit purposes (Appendix B11).

From here the discussion focusses on the responses of the MEs and NMEs in terms of the different types / components (waste, pollution, air, water and oil spill) of environmental training programmes.

4.2.4.1 Waste and oil spill related training

The MEs (63.6%) and NMEs (61.4%) response percentages were very close to each other regarding “waste” training programmes in WLPs (Table 4.2.1; Table 4.2.2).

Waste is the core business of WLPs. These companies have waste license permits from TNPA, the local authority and national department. They must comply with legislative requirements in order for any of their operations to function. In order for a company to be issued with a license permit to handle waste, they need to provide appropriate training for the personnel as part of some requirements, amongst others. This is a requirement of the Waste Act (No. 59 of 2008), as amended in Government

notice no. 1093, and also the City of Cape Town's (2010). Integrated Waste Management by-laws (City of Cape Town, 2010b; Republic of South Africa, 2008a).

The WLPH's had the highest response percentages for "oil spill" training programmes compared to the other target groups (ME's [81.8%] and NME's [74.3%]) (Table 4.2.1; Table 4.2.2). The WLPH's have developed emergency standard operating procedures to deal with any oil spill event. This is a fundamental part of their functions in the port. Most of the WLPH's operating in the Port of Cape Town are able to handle oil spill clean-ups as part of their operations. For oil spill incidents a WLPH activates a response team to ensure minimum negative impact on employees, contractors, the environment, and the public at large. In order to provide an effective response to oil spill incidents all WLPH employees are trained to respond appropriately to such emergencies (DCD Marine Cape Town (Pty) Ltd, 2015c). They must also be trained to transport dangerous goods by road and are provided with certificates of competency, which is valid for a period of one year. This training programme must be offered by accredited service providers. The Minister of Transport approves providers of training for dangerous goods in terms of Regulations 115(f), 117(e), and 280 of the National Road Traffic Act (Act 93 of 1996) (Republic of South Africa, 1996b). Because oil spill management is a fundamental part of the functions of WLPH's and is also legally regulated, they need to ensure that appropriate training on the subject is offered to their employees, otherwise their licence permits will not be issued or renewed. This study revealed that WLPH's indeed seem to comply with regards to "oil spill" training programmes, as can be seen by the response percentages that were higher than for any of the other target groups.

4.2.4.2 Pollution and water related training

The ME's response percentage for "pollution" related training was 36.4%, while the response percentage for "water" related training was 27.3%. The NME's response percentage for "pollution" related training was 30.0%, while that for "water" related training was 28.6% (Table 4.2.1; Table 4.2.2). The majority of the employees seemingly were not trained as far as "pollution" and "water" is concerned.

The SHE policies of the WLPH's indicate that their management structures are committed to creating a safe working environment for its employees, by preventing

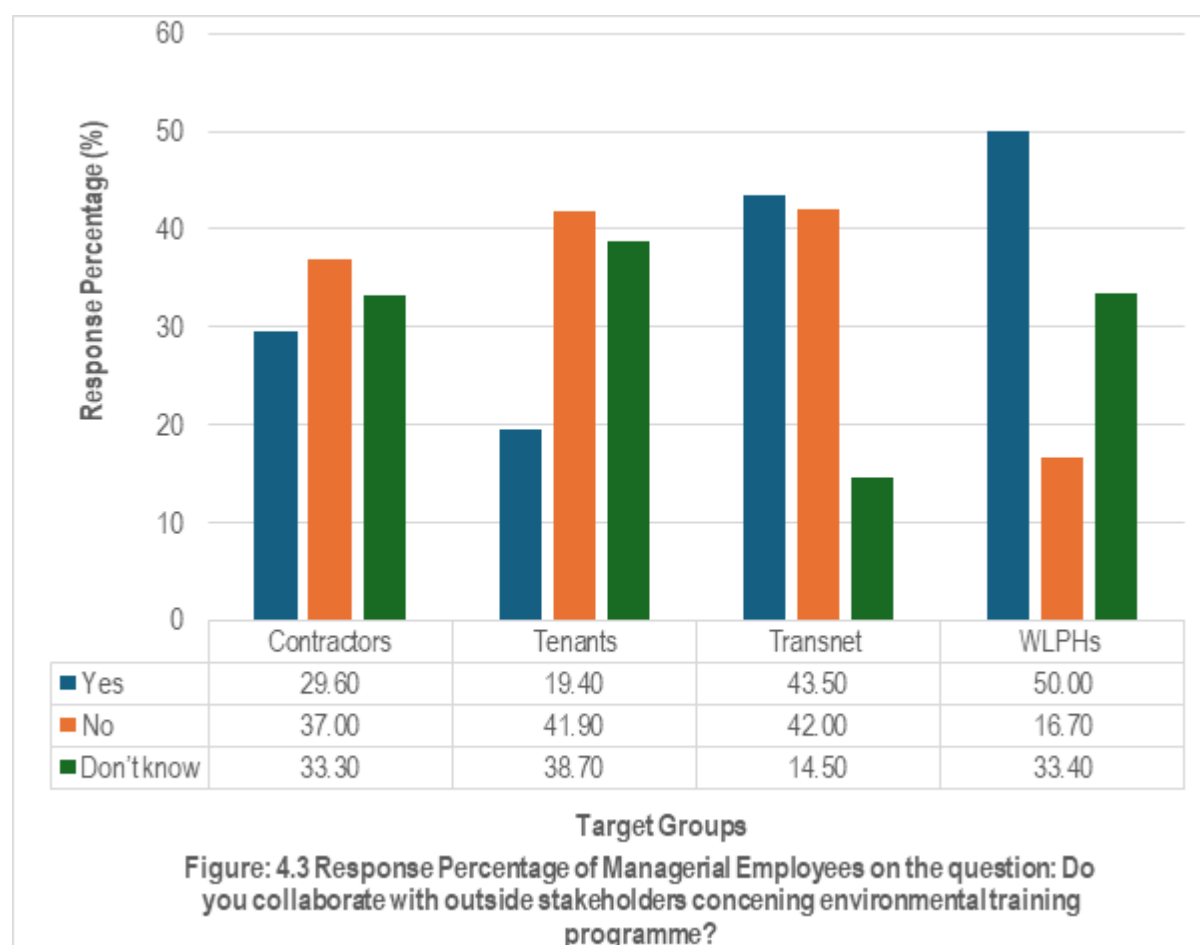
pollution, being cautious in using water and conducting the business in an environmentally friendly manner (DCD Marine Cape Town (Pty) Ltd, 2015b). Furthermore, to raise the level of awareness and providing appropriate training to ensure that the employees are competent to do their work and protect the environment (Swift Tank and Oil Solution, 2015; DCD Marine Cape Town (Pty) Ltd, 2015c). It is important to understand the operational activities and the role of the employees at the workplace in order to prioritise environmental issues that may affect the environment negatively including the mitigation measures that goes along with them (Gusmerotti *et al.*, 2023). It seems as if the pollution and water issues are not a major part of the scope of their work. The low response percentages may not mean that “pollution” and “water” training are neglected but that they are less of a priority for WLPH's.

4.2.4.3 Air pollution related training

The response percentages of the ME's (18.2%) and NME's (20.0%) for “air pollution” training were the lowest response percentages recorded (Table 4.2.1; Table 4.2.2).

The EMPs of the WLPH's indicate that all waste transport is placed on a maintenance schedule and be regularly serviced as a control measure for managing air pollution. Additionally, when vehicles go for servicing, testing of NOx (Nitrogen Oxide) emissions is also completed (DCD Marine Cape Town (Pty) Ltd, 2015c). The possible reason that can be deducted why air pollution is a low priority for them could simply be that it is outside the scope of their activities and air pollution may not be part of their responsibility to manage. The fact that they transport waste does not make them responsible for air pollution management.

4.2.5 Responses of managerial employees (ME's) regarding collaboration with outside stakeholders concerning environmental training programmes



There were no statistical significant differences between the ME's from all the target groups with regards to collaboration with outside stakeholders on environmental training programmes ($P > 0.05$) (Figure 4.3).

The uncertainty of the “don't know” response may be interpreted as a negative response and can be considered to be closer to a “no” response than a “yes” response. If there was collaboration with outside stakeholders, it would have been known to the respondents.

4.2.5.1 Contractors

Most of the ME's (37%) chose the "no" option to this question (Figure 4.3). 33.3% of ME's chose the "don't know" option, while 29.6% of the ME's chose the "yes" option (Figure 4.3).

In the heading 2.9.2 (contractors sampling procedure), it is explained that most contractors spend a short period of time (a few weeks) to do their work and then leave the port, depending on the scope of work. In addition to this, most of the ME's (57.1%) responded to the question "what is the nature of the job?" that their basic conditions of employment were fixed period contracts (Appendix A10.1&2; Appendix A12.1&2). It may not be useful to attempt to have collaborative links with outside stakeholders to help with training of employees before a particular contract starts since many contracts are for a relatively short period (two weeks to a month). The ME's of contractors who choose the "yes" (29.6%) option may have relatively lengthy contracts and thus a longer period to spend at the port, making it useful to involve outside stakeholders in the training of employees on specialised environmental topics. Silverstein (2018) states that the disadvantage of contract workers is that they are employed for a short period for a particular function. This group of contract employees are not invested in training during their period of employment because they are more focused on completing the work that is required within the contract period. Furthermore, there is no general rule that suggests that where training is not offered that there is no commitment from the employees towards the organisation (Campbell & Wasley, 1993; Haleblan & Finkelstein, 1999; Gusmerotti *et al.*, 2013).

An interview was conducted with the Solid Waste Management Department of the City of Cape Town. They responded to the question: "What environmental training programmes do you have in place that may be applicable for port users?"

There are waste legislation update training workshops run by the city departments such as the Environmental Resources Management Department. Public awareness and education training are also done. Another response was that various private sector training experts take part and the training includes formal training for waste management.

The same question was asked in an interview with the Environmental Resources Department of the City of Cape Town. Their responses were:

“Training programmes varies from solid waste, liquid waste, air and general environmental management”.

Departments in the City of Cape Town offer relevant training opportunities that can be taken up by port users such as contractors. The ME's and NME's of the contractors should attend these workshops offered by the local government in order to receive training with regards to new developments in environmental legislation and requirements in relation to their operational activities in the port (TNPA, 2024, TNPA 2019b). Due to the requirement that a SHEP file must be submitted to the TNPA, employees of contractors need to stay updated on new legislative matters (TNPA, 2015b; Appendix B4). Therefore, it is important that they attend training events. However, it is clear that less than 30% of contractors do their training in collaboration with outside stakeholders.

4.2.5.2 Tenants

The ME's of tenants mostly chose the “no” option (41.9%) for this question (Figure 4.3). The results also revealed that 38.7% of the ME's chose the “don't know” option, while only 19.4% chose the “yes” option (Figure 4.3).

In the heading 2.9.3 (tenants sampling procedure), it is clear that most of the tenants, at the time of data collection, were privately owned with a few governmental departments leasing property in the grounds of the port. The results indicate that there is a low level of collaboration with the outside stakeholders. The training seems to be mostly conducted from inside the organisation by their own. It is in those exceptional training courses that requires a proof of a certificate with an accredited institution (for instance, oil spill certificate or handling of hazardous waste). More often not all the employees will attend but few employees based on their operational requirements. Then the training with the small, attended group will be shared with most of the employees. It is then not surprising to have a low response percentage for tenants not collaborating with outsiders' stakeholders because training was internally conducted for their employees. It could be possible this method of training is allowed to accommodate the operations instead of sending all the employees at once. It might

be possible to be economically viable to do so in benefiting the organisations. As pointed out in heading 4.2.5.1 the City of Cape Town do offer applicable training programmes that can be attended by port users such as tenants.

The tenants send only few employees for training offered by the City of Cape Town. Then the rest of the employees will receive training from those who attended the programme (TNPA, 2019b).

4.2.5.3 Transnet

The ME's mostly chose the "yes" option (43.5%) for the question: "Do you collaborate with outside stakeholders concerning environmental training programmes" (Figure 4.3). 42.0% of ME's chose the "no" option, while 14.4% chose the "don't know" option (Figure 4.3).

Transnet has many years collaborating with different outside stakeholders with regards to various environmental training programmes. For instance, the Port of Cape Town hosted a port management training programme in collaboration with the International Ocean Institute (IOI) some years ago (IOI, 2019; Appendix C8). Other collaborative training programmes have also been conducted together with outside stakeholders, such as the South African Maritime Safety Authority (SAMSA) and the Department of Transport (DoT) where training workshops were provided on environmental protection procedures and new regulation requirements, amongst others (SAMSA, 2019). The pollution control team of Transnet is very involved with outside stakeholders on oil spill contingency plan programmes and associated training programmes (TNPA, 2019a). Transnet has also collaborated with other international ports on the advancement of the knowledge of its ME's with regards to environmental training programmes (Appendix C9; Appendix C10). The study revealed that Transnet is collaborating with a number of outside stakeholders on matters that relate to environmental training programmes. However, the "no" response percentage has shown that not all ME's within Transnet collaborate with outside stakeholders on environmental training matters. This is probably an effect of the different functions fulfilled by ME's in the organisation.

As discussed in heading 4.2.5.1 the government of Cape Town provides opportunities to collaborate on environmental training. Transnet ME's are involved in relevant governmental training workshops and summits that deal with environmental issues. Transnet does not only attend these events but play facilitation roles in, for example, the national summit where local, provincial and national government, as well as industries, academia and communities are involved in matters related to environmental conservation (Melato & Phaladi, 2019). Transnet's involvement in collaboration with government is beneficial for its ports, including the Port of Cape Town. Transnet also participates in INTERPOL's Pollution Crime Working Group (PCWG) and the Environmental Compliance and Enforcement Committee (ECEC). These groups work towards intensifying their efforts to fight pollution (DEA, 2018a). These teams meet on an annual basis on issues related to pollution crime. It is a platform where information is shared on the best practices and discussions are held on issues that threaten the environment. Ports have been inspected on several occasions to keep a check on the activities of port users. The South African Department of Environmental Affairs takes a leading role in this. This collaborative programme has been beneficial to ports that take part. It has assisted ports to comply and helped with environmental training programmes (DEA, 2018a). This collaboration could possibly be assisting in minimising the short fall that is encountered by Transnet, especially in environmental matters where there is a lack of human resources to inspect port activities that is likely to threaten the environment. The above indicated Transnet is collaborating in ample platforms with outside stakeholders, however, approximately 57% of ME's did not provide positive response. This response percentage indicates that there are still areas of improvement as far as collaboration with stakeholders is concerned.

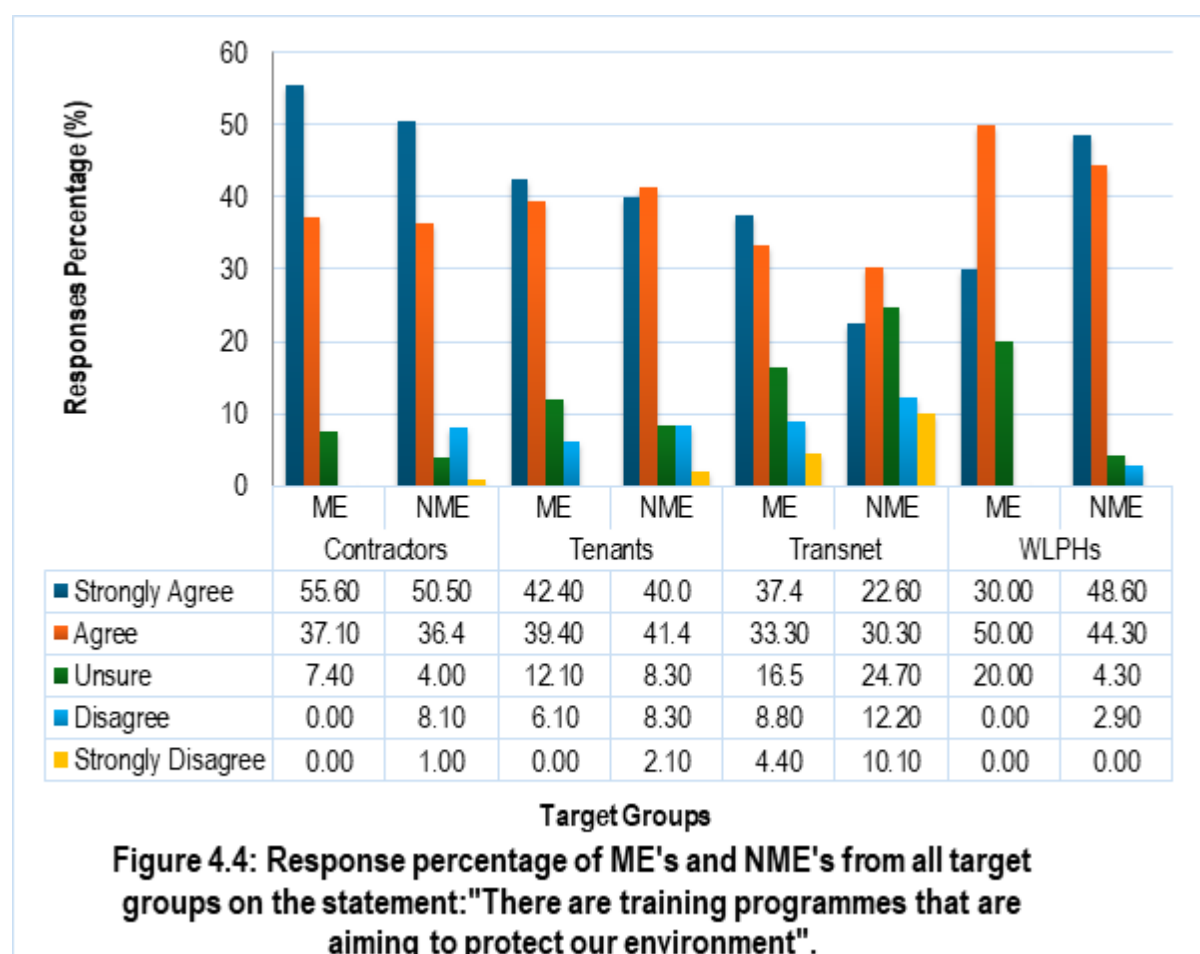
4.2.5.4 Waste Licence Permit Holders

The ME's of WLPH's mostly chose the "yes" option (50.0%) when answering the question: "Do you collaborate with outside stakeholders concerning environmental training programmes" (Figure 4.3). The "don't know" option was chosen to a lesser degree by the ME's (33.4%), while only 16.7% of the ME's chose the "no" option (Figure 4.3).

The core business of WLPH's rely on the compliance with the governmental and legal requirements. The majority of the WLPH's were collaborating with the outside stakeholders concerning environmental training programmes. In many developing countries the majority of urban metropolitan areas continue to struggle with the management of waste. A challenge in these metropolitan areas have been the collection, transportation and disposal of waste. This has led to indiscriminate and illegal dumping of waste (Madzindu *et al.*, 2012). Due to this continues problem with the collection, transport and disposal of waste, there is a need for all the companies that handle waste to register with the relevant authorities. Before a waste licence permit is issued the relevant authority conducts an audit. The same process is followed by Transnet before a waste licence permit is issued (Republic of South Africa, 2005). Due to the legislative requirements to get waste licence permits, those companies attend workshops or seminars offered by government that deals with environmental and waste management issues. There are also workshops conducted for inputs from industries for improvement in environmental and waste management issues for possible changes in legislation and improvement in this sector (DEFF, 2020a; DEA, 2014/5; Appendix C11).

It is clear from the interview responses of government officials (heading 4.2.5.1) that they create the opportunity to collaborate on training programmes. In order for companies to get waste licence permits they should comply with governmental requirements and part of the compliance is the attendance of training programmes to update such companies on the latest legislation and regulations (DEA, 2018b; DEFF, 2020a). Therefore, the high response percentage provided by ME's on the "yes" option of the question about collaboration with outside stakeholders on environmental training makes perfect sense. High levels of training collaboration are to the advantage of the WLPH's, their customers and government.

4.2.6 Responses of ME's and NME's from all target groups regarding training programmes that aim to protect the environment



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement posed to them: "There are training programmes that are aiming to protect our environment" ($P > 0.05$) (Figure 4.4).

4.2.6.1 Contractors

The ME's and NME's overwhelmingly chose the options of "strongly agree" (55.6 and 37.1%, respectively) and "agree" (50.5 and 36.4%, respectively) for the statement: "there are training programmes that are aiming to protect our environment" (Figure 4.4). Much less of the ME's (7.41%) and NME's (4%) chose the option of "unsure". No ME's chose "disagree" or "strongly disagree". Only a few of the NME's chose the options "disagree" (8.1%) and "strongly disagree" (1%) (Figure 4.4).

In the responses concerning environmental training programmes (in heading 4.2.1) the ME's and NME's of contractors had the highest response percentages (Table 4.2.1 and Table 4.2.2). From the discussion in heading 4.2.1, it is clear that the contractors were exposed to environmental training programmes. Therefore, it is not surprising for both ME's and NME's of the contractors to agree that there are training programmes that are aiming to protect the environment. This could mean that the training that the ME's and NME's were exposed are relevant environmental programmes that addressed and provided an understanding as far as environmental protection is concerned. Bird (1996) argued that environmental training is advantageous to both the individual and the organization as a whole in protecting the environment. This provides skills and knowledge for environmentally conscious decisions to be taken in order to minimize the impact of human activities on the environment (Fryxell & Lo, 2003; Young *et al.*, 2013). The more employees are provided with appropriate environmental training programmes, the more knowledgeable they become, and this helps in their roles and responsibilities in the workplace as far as decisions and actions that may affect the environment.

4.2.6.2 Tenants

The ME's and NME's overwhelmingly chose the options of "strongly agree" (42.4% and 39.4%, respectively) and "agree" (40 and 41.4%, respectively) for the statement: "there are training programmes that are aiming to protect our environment" (Figure 4.4). Much less of the ME's (12.1%) and NME's (8.3%) chose the option of "unsure". A few of the ME's and NME's chose the options of "disagree" (6.1 and 0%, respectively) and "strongly disagree" (8.3 and 2.1%, respectively) (Figure 4.4).

Tenants are required to provide environmental management plans (EMPs) to the TNPA's Property and SHE departments. Training in relevant environmental matters is an integral part of an EMP, and such training must be offered to the employees of tenants. Baby (2011) argued that the companies are required to develop EMPs in order to demonstrate that their activities can be mitigated and managed from an environmental standpoint. The United States Environmental Protection Agency (2005) stated that an EMP is the action that a company is applying to establish a manner in which the activities affect the environment. From the results it seems as if the training indeed aims to protect the environment, from the perspective of the respondents.

4.2.6.3 Transnet

The ME's and NME's mostly chose the options of "strongly agree" (37.4% and 33.3%, respectively) and "agree" (22.6 and 30.3%, respectively) for the statement: "there are training programmes that are aiming to protect our environment" (Figure 4.4). Much less of the ME's (16.5%) and NME's (24.7%) chose the option of "unsure". The ME's and NME's chose the options of "disagree" (8.8 and 4.4%, respectively) and "strongly disagree" (12.2. and 10.1%, respectively) to a lesser degree (Figure 4.4).

According to Welford (2005) Asian companies had less commitment in the development of staff when compared to North American and European companies. The written policies of corporate social responsibilities were in place and implemented in North American and European companies, while in Asian companies there were a lack of written policies and where policies were available there was no commitment to implement. Liu *et al.* (2014) argued that the more the organisation commit to the development of its employees in educating them about their business and their environmental obligations, the more they are encouraged and show commitment in environmental protection. It is crucial for managers to ensure that there is sufficient knowledge shared with different levels of employees through training (Hernandez & Monroe, 2000). Furthermore, the employees should be encouraged and motivated with properly designed training programme (Milfont & Duckitt, 2010). Transnet has environmental policies and procedures in place. The SHEQ policy of Transnet, commits the organisation to adhere to environmental requirements in order to demonstrate the best practice that will also influence its customers to ensure that the environment is protected. This policy also states that the organisation will ensure that its employees will be introduced to various training programmes so that they have knowledge and competency when carrying out their duties and can do so without neglecting their role of protecting the environment (Transnet SOC Ltd, 2020). However, the response percentages of ME's and NME's for the "strongly agree" and "agree" options were the lowest for Transnet compared to the other target groups (Figure 4.4). To some degree this result is not surprising. In heading 4.2.1 other results on training matters were discussed. It was pointed out that the moratorium, imposed by the Transnet top management, must have had an impact on the training of the NME's on matters that relate to the environment. As much as there are appropriate policies in place to protect the environment, there seems to be a lack of implementation

of those policies, in terms of environmental training programmes, due to the restrictions of the moratorium.

4.2.6.4 Waste Licence Permit Holders

The ME's and NME's overwhelmingly chose the options of "strongly agree" (30.0 and 50.0%, respectively) and "agree" (48.6 and 44.3%, respectively) for the statement: "there are training programmes that are aiming to protect our environment" (Figure 4.4). Much less of the ME's (20.0%) and NME's (4.3%) chose the option of "unsure". No ME's choose "disagree" or "strongly disagree". Only 2.9% of the NME's chose the option "disagree" (Figure 4.4).

The WLPH's have an environmental policies and procedures in place as well as EMP's (Swift Tank and Oil Solution, 2015; DCD Marine Cape Town (Pty) Ltd, 2015b&c; Appendix C12; C13). In order to perform their duties related to waste properly these policies and procedures must be implemented. Due to the nature of their business and operational activities, in most cases, the WLPH's perform their duties on behalf of their customers. This requires strict environmental care when performing their tasks, especially on the premises of clients. In performing their work at a client's premises, WLPH's has to manage reputational risk and must ensure that they do not fail to implement proper environmental and waste management procedures. One way of doing this is to offer environmental training programmes to their employees (Olson *et al.*, 2016). This is also a way to ensure that they protect the environment in the process of doing their work to manage waste on behalf of their clients (Harrington *et al.*, 2009). The more employees are engaged in environmental training the more improvement is seen in the fulfilling of their tasks (Forck, 2005). From the results it is clear that training programmes to protect the environment are a priority for ME's and NME's of WLPH's.

ABSTRACT

An excessive rate of resource intake with an increasing quality of life has made an unintentional and negative impact on the urban environment and its surroundings. The governments and agencies do not have capacity to handle the enormous amount of waste generated in urban areas. Humanity has the capability to make means in development that are sustainable towards the environment - to ensure that it meets the needs of the existing generation without compromising the capability of future generations to meet their own needs. Knowledge is important for actions to be successful. In promoting a certain behaviour in society, knowledge-based campaigns were found to be successful. The purpose of the study was to determine to what extent is the knowledge of Port users towards port environment in the Port of Cape Town. Furthermore, what is the role of authority imparting environmental knowledge as it pertains to waste and pollution for port users. The data has been analysed by using SPSS 25 software programme and Microsoft Office Excel. For the most part, it was found that appropriate labelling of waste reception facilities for the type of waste promote waste segregation and correct disposal of waste. However, instances were found where labelling of waste reception facilities did not take place, consequently, waste was not segregated and properly disposed. The study revealed that employees can gain knowledge through the experience of operational port services as well as in training and awareness.

5.1 INTRODUCTION

An excessive rate of resource consumption with an increasing quality of life has created an unintentional and negative impact on the urban and natural environment. Governments and agencies do not always have capacity to handle the enormous amount of waste generated in urban areas. If those that are living in urban areas fail to behave pro-environmentally, a gradual but a definite deterioration of the environment is expected in the near future (Saripah *et al.*, 2013a). This is likely to compromise the benefit that future generations were supposed to possess from the environment. Humanity has the capability to develop the economy in a way that are sustainable towards the environment - to ensure that it meets the needs of the existing generation without compromising the capability of future generations to meet their own needs (WCED, 1987).

Knowledge is important for actions to be successful. In promoting a certain behaviour in society, knowledge-based campaigns were found to be successful (Boerschig & De Young, 1993). In overcoming psychological barriers such as misinformation and possible ignorance in the society, knowledge is regarded as a means to rectify or bring change. Knowledge has the potential to “spark” other mechanisms that may lead to behavioural change (Schahn & Holzer, 1990; Pratkanis & Turner, 1994). According to Mostafa (2007), knowledge considers the individual’s understanding gained over the years that has the potential to make positive changes on the natural environment surrounding them.

A person’s behaviour may be informed by the knowledge that a particular individual has obtained. In conjunction with this, more often the education intervention depends on the knowledge transferred (Frick *et al.*, 2004). Environmental knowledge can be classified in different forms, namely, (i) systematic knowledge (ii) action related knowledge and (iii) benefit (effectiveness). According to Schahn and Holzer (1990) systematic knowledge covers the question of “how” the ecosystem operates. Ernest (1994) and Frick *et al.* (2004) indicated that the action related knowledge is more concerned about “knowing how” or understanding the knowledge of behavioural options that are available and possible courses of action related to those options. Kaiser and Fuhrer (2003) argued that environmental benefit (effectiveness) knowledge is more concerned about the benefit or gain in considering certain actions to be taken,

which is more appropriate for successful actions in conserving the environment. Tikka *et al.* (2000) argued that activities related with nature, attitudes and knowledge cannot be separated completely, especially on the conditions pertaining to the surrounding environment. In studying the relationship between behaviours and attitudes, many scholars agreed and proved that knowledge is one of the main predictive factors that holds capacity (Mostafa, 2007; Pickett-Baker & Ozaki 2008; Polonsky *et al.*, 2012). Most researchers agree that knowledge is one of the contributing factors that influence risk perception (Urban & Hoban, 1997; Bosschaart *et al.*, 2013; Kim *et al.*, 2014; Saari *et al.*, 2021; Zeng *et al.*, 2023). Keller *et al.* (2012) added by stipulating that if people have inadequate knowledge as far as the environment is concerned, it will not be possible for them to judge risks associated with the environment.

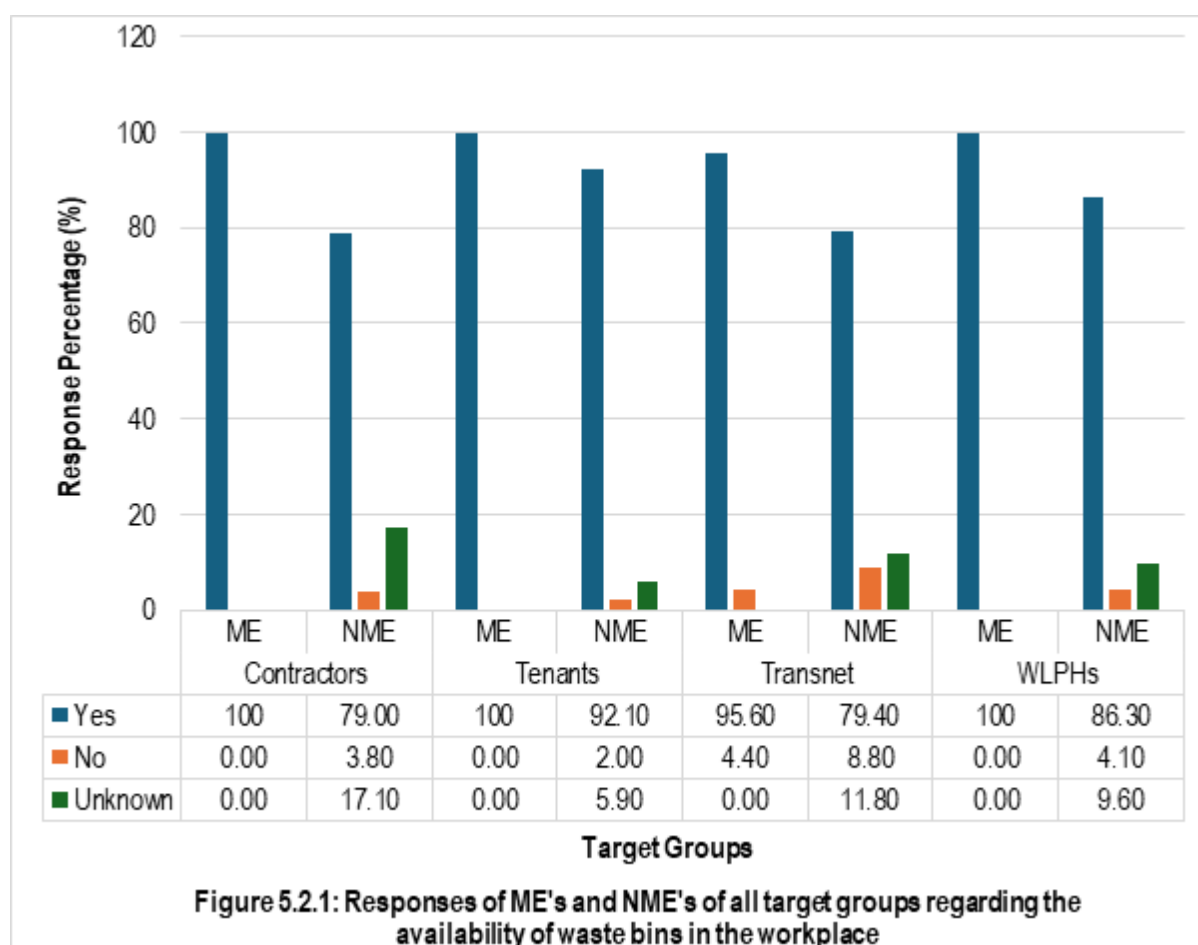
It is the responsibility of every government to provide environmental education for its society and industries. In so doing that will assist the public and industries to enhance their level of environmental knowledge, in order for the environment to be taken care of (Latif *et al.*, 2013; Varela-Candamio *et al.*, 2018). Schultz (2010) argued that people with significant environmental knowledge are capable of environmental care. The manner in which people behave towards the environment rely solely on environmental knowledge they have obtained. However, friendly environmental actions cannot be promoted by environmental knowledge only (Wiek *et al.*, 2011). According to de Miranda Coelho *et al.* (2016) beliefs and perception play crucial roles in individuals' environmental knowledge. Liu *et al.* (2020) stated *that environmental knowledge can influence pro-environmental behaviour provided individuals have internalized and absorbed their beliefs and perceptions.*

The research objective for this chapter was to determine the extent of the knowledge of port users towards the environment in the Port of Cape Town.

5.2 RESULTS AND DISCUSSION

Transnet in the results refers to the Transnet National Ports Authority (TNPA). The target groups for this study were contractors, tenants, Transnet and waste licence permit holders (WLPH's), as well as selected government department officials, as explained in chapter 2. Self-administered questionnaires were used for managerial employees (ME's) and non-managerial employees (NME's) of the 4 target groups. Structured interviews were used for government department officials. The collected data was tabulated and coded (Appendix A10.1&2). An explorative descriptive study and statistical analysis was done using SPSS 25 software and Microsoft Office Excel (Shil *et al.*, 2013; Appendix A12.1&2). The data mainly consists of non-parametric ordinal and nominal data. Chi square analysis was used to search for statistical significant influences of independent variables on dependent variables.

5.2.1 Responses of ME's and NME's of all target groups regarding the availability of waste reception facilities in the workplace



There were no statistical significant differences between the ME's from all the target groups with regards to waste bin availability in their workplace ($P>0.05$) (Figure 5.2.1). The uncertainty of the “unknown” response may be interpreted as a negative response and can be considered to be closer to a “no” response than a “yes” response, or even an indication of ignorance.

5.2.1.1 Contractors

The ME's and NME's overwhelmingly chose the option of yes (100 and 79.0%, respectively) for the statement: “waste reception facilities are available in the work area” (Figure 5.2.1). Only a few NME's chose the option of unknown (17.1%) (Figure 5.2.1).

In the application form to use the dry docks it states under Section 3 (heading: pollution control at dry dock facilities) that no work will commence without waste skips or bins

on site (Appendix D1). The contractor should have their own waste reception facilities when conducting any operation within the port premises. The majority of the contractors were contracting WLPH's in hiring their waste reception facilities and managing the transportation of the waste disposal to the landfill site and/or to the right recycling organizations. The waste and the recyclables are also required to be separated in different skips or bins on the site of activity. It is also required that waste and recyclables be taken to appropriate sites for further processing (TNPA, 2015b). WLPH's normally provide the contractors with waste disposal certificates (Appendix D2). These safe disposal certificates are kept in the approved safety health and environment file for record keeping purposes. The safe disposal certificates form part of the returnable documents in the SHE files, as indicated in heading 3.2.4 (*contractor responses (ME's and NME's) concerning environmental awareness programmes*). In the study conducted by Ahmad *et al.* (2017), 69% of the responses of the employees at the workplace indicated that there were no waste reception facilities available to use and the housekeeping element was found to be low. That study recommended that the facilities be made available and also that training and awareness of the staff take place. In the current study it is clear that waste reception facilities are available, and employees have knowledge of this.

The ME's are responsible for ensuring that the waste reception facilities are available for disposal of waste in the operations as per the Waste Act of 2008. Due to their position and responsibility, it is not surprising for them to be knowledgeable of the waste reception facilities' availability. The NME's are the main users of the waste reception facilities due to operational requirements, so to them being knowledgeable of the availability of waste reception facilities is essential for their job functions to take place.

5.2.1.2 Tenants

The ME's and NME's overwhelmingly chose the option of yes (100 and 92.1%, respectively) for the statement: "waste reception facilities are available in the work area" (Figure 5.2.1). Only some of the NME's chose the option of unknown (5.9%) (Figure 5.2.1).

TNPA as the landlord also assist the tenants that are willing to make use of the service providers contracted by Transnet for waste management and the supply of waste

reception facilities. This process is handled during the signing of the lease agreement between tenants and the TNPA (TNPA, 2015b & 2020a).

Those tenants that do not use the services of Transnet for waste reception facilities and management of waste would normally use their own waste reception facilities or have a contract with WLPH's for waste collection service. The overwhelming "yes" response from the ME's and NME's is thus not surprising. The decision of ensuring that the waste reception facilities are in place lies with the ME's. They are responsible for signing of the agreement with TNPA and / or directly with waste service providers. The NME's use the waste reception facilities to dispose waste as they conduct their day- to-day activities. It is a very positive result that the tenant ME's and NME's are knowledgeable about the availability of the waste reception facilities at their workplace.

5.2.1.3 Transnet

The ME's and NME's overwhelmingly chose the option of yes (95.6 and 79.4%, respectively) for the statement: "waste reception facilities are available in the work area" (Figure 5.2.1). Only some NME's chose the option of unknown (11.8%) (Figure 5.2.1).

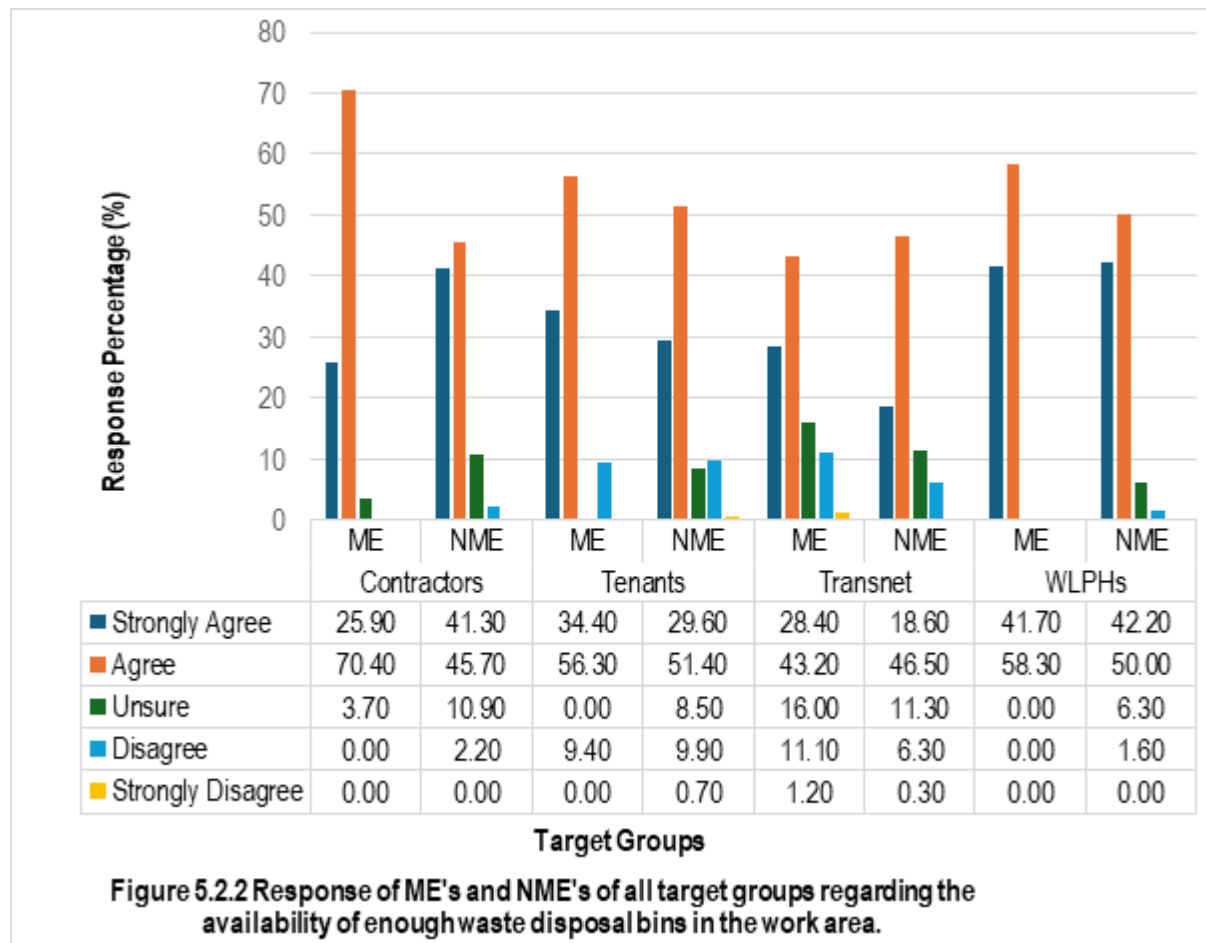
Waste specifications for contracts include the process of recycling and other means of procuring the bins for separation of waste. Reception facilities are provided by the Port of Cape Town for oily waste, sewage, garbage and quarantine waste (CEFAS, 2020). Transnet management has contracted WLPH's to manage the different waste within the port premises (TNPA, 2015b & 2020a). This explains why the ME respondents mostly chose the "yes" response. The ME's knowledge and function regarding waste specification and procurement of bins ensured their responses on waste bin availability. The NME's also use the waste reception facilities daily as they are required to dispose waste appropriately in their respective operational areas. The finding of this question is a positive result in terms of Transnet employee's knowledge on waste bin availability.

5.2.1.4 WLPs

The ME's and NME's overwhelmingly chose the option of "yes" (100 and 86.3%, respectively) for the statement: "waste reception facilities are available in the work area" (Figure 5.2.1). Only some NME's chose the option of "unknown" (9.6%) (Figure 5.2.1).

The supply of waste reception facilities (reception facilities) is part of the WLP's core business. The ME's ensures that waste reception facilities are available for both the customers as well as for their own operational activities. It is the duty of the NME's to deliver waste reception facilities to the clients on regular basis and for their own use in the waste operations. In that way they can notice the availability of waste reception facilities in the workplace. Furthermore, the NME's perform the maintenance of the waste reception facilities among the other duties. Additionally, in order for waste service providers to obtain a waste permit from Transnet as well as the City of Cape Town, the service provider must demonstrate type of waste reception facilities available in their services (Republic of South Africa, 2005; CCT, 2010b). It is therefore not surprising for ME's and NME's to be knowledgeable of the availability of waste reception facilities at the workplace.

5.2.2 Responses of ME's and NME's of all target groups regarding the availability of enough waste disposal bins in the work area



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement posed to them: "There are enough waste reception facilities in the work areas" ($P > 0.05$) (Figure 5.2.2).

5.2.2.1 Contractors

The ME's and NME's mostly chose the options of "strongly agree" (25.9 and 41.30%, respectively) and "agree" (70.4 and 45.7%, respectively) for the statement: "There are enough waste reception facilities in the work areas" (Figure 5.2.2). Some of the ME's (3.7%) and NME's (10.90%) chose the option of "unsure". Only a few NME's chose "disagree". (Figure 5.2.2).

The SHE plans of contractors requires that provision should be made for extra waste reception facilities and/or waste reception facilities should they be required on site for

operations (Melato & Mohajane, 2014; Raubex Construction (Pty) Ltd, 2017). This SHE plans requirement explains the predominantly positive response to the statement: “There are enough waste reception facilities in the work areas” from contractor’s employees. The ME’s are responsible for the implementation of the SHE plans. This puts them in a position to be knowledgeable regarding the sufficient supply of waste reception facilities. The response percentages clearly suggests that the NME’s are of the opinion that enough waste reception facilities are supplied.

5.2.2.2 Tenants

The ME’s and NME’s overwhelmingly chose the options of “strongly agree” (34.40 and 29.60%, respectively) and “agree” (56.3 and 51.40%, respectively) for the statement: “There are enough waste reception facilities in the work areas” (Figure 5.2.2). Only some NME’s (8.50%) chose the option of “unsure”. A few of the ME’s and NME’s chose the options of “disagree” (9.4 and 9.9%, respectively) and “strongly disagree” (0.0 and 0.07%, respectively) (Figure 5.2.2).

Section 11(j) of the National Ports Act (Act 12 of 2005) states: The authority must also ensure that any person who is required to render any port services and port facilities is able to provide those services and facilities efficiently (Republic of South Africa, 2005). Tenants in their operations consider the requirements of the Ports Acts 2005 to ensure that reception facilities are sufficient for efficient services.

The majority of the tenants prefer the TNPA to assist them with waste reception facilities, as indicated in heading 5.2.1.2. They also have the option of requesting extra bins at any given time. The tenants only must indicate the number of waste reception facilities required by completing the waste service request form (Appendix D1.2). The tenants are also entitled to receive safe disposal certificates for any amount of waste collected in the port for disposal (TNPA, 2015b & 2020a). Furthermore, the environmental specialist of the particular tenant can also request waste reception facilities where there is a need in order to meet the requirement of their environmental management plans (EMPs) (TNPA, 2020c). In the EMPs it is stated that the organisation will ensure that the resources for operational activities will not be compromised, so that the implementation of the environmental management plans is achieved (DCD Marine Cape Town (Pty) Ltd, 2015c). Some tenants request additional

waste reception facilities from WLPH's as well, especially those that do not use the Transnet waste management arrangement. The EMP's and job requirements demand that enough waste reception facilities are available. It is also the opinion of the tenant employees that enough waste reception facilities are available in the work areas.

5.2.2.3 Transnet

The ME's and NME's chose the options of "strongly agree" (28.4 and 18.16%, respectively) and "agree" (43.2 and 46.5%, respectively) for the statement: "There are enough waste reception facilities in the work areas" (Figure 5.2.2). Fewer of the ME's (16.0%) and NME's (11.3%) chose the option of "unsure". Even less of the ME's and NME's chose the options of "disagree" (11.10 and 6.3%, respectively) and "strongly disagree" (1.2 and 0.3%, respectively) (Figure 5.2.2).

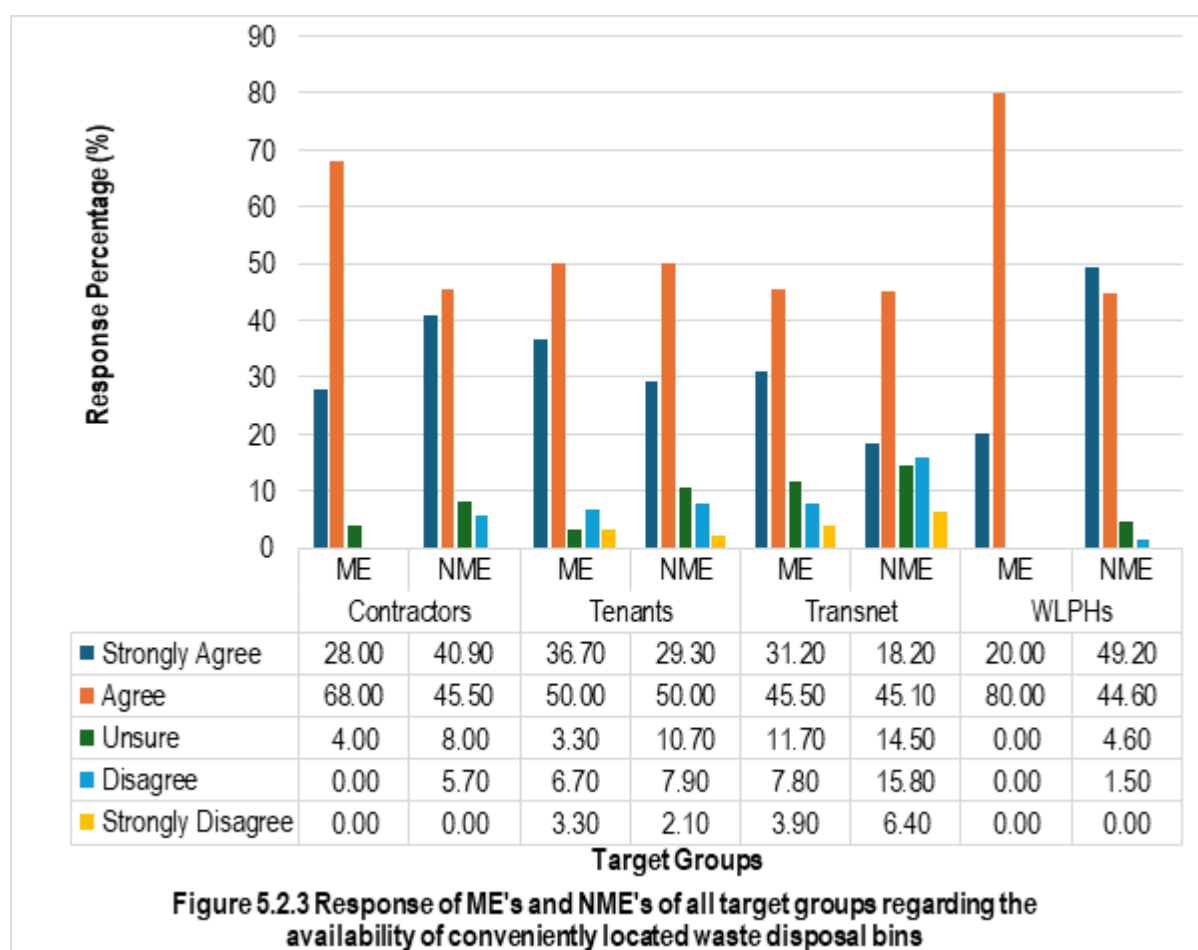
There are reception facilities provided by the Port of Cape Town for oily waste, sewage, garbage and quarantine waste. The TNPA provides reception facilities for all its users (TNPA, 2015b & 2020a; CEFAS, 2020). The contract specifications of TNPA made a provision for ad hoc waste skips or bins for any project that may need extra waste reception facilities on site (TNPA, 2017a). Port rule Section 89 indicates that the Port of Cape Town must provide adequate port waste reception facilities. Every terminal operator should provide or procure adequate facilities for the reception of waste from vessels using the port terminal. In assessing the adequacy of the waste reception facilities provided, the terminal operator should have regard to the Authority's Waste Management Plan (DoT, 2009). Furthermore, the external waste management audit which was conducted in 2014 revealed that there were sufficient waste reception facilities which were conveniently located for easy access by the users in the Port of Cape Town (GES, 2014). The contract specifications, waste management audits, the supply of waste reception facilities onsite, contributed to the knowledge of ME's and NME's regarding adequate availability of waste reception facilities. Even office workers should know about waste reception facilities. They also need to dispose of office waste.

5.2.2.4 WLPs

The ME's and NME's overwhelmingly chose the options of "strongly agree" (41.7 and 42.2%, respectively) and "agree" (58.3 and 50.0%, respectively) for the statement: "There are enough waste reception facilities in the work areas" (Figure 5.2.2). Only some NME's (6.3%) chose the option of "unsure". A few of the ME's and NME's chose the options of "disagree" (0.0 and 1.6%, respectively) and none chose "strongly disagree" (Figure 5.2.2).

In order for any waste service provider to get waste permit, in the application form the service provider must indicate the availability of the waste reception facilities and the type thereof (Republic of South Africa, 2005), as indicated in heading 5.2.1.4. The provision of waste reception facilities, collection and waste disposal are regarded as the core business of the WLP's. The WLP's therefore had more than enough waste reception facilities to supply, as stipulated in heading 2.9.4 of chapter 2. It is reasonable to assume that the response percentages were so skewed towards "strongly agree" and "agree" for the WLP's because waste management services are their core business on the port working environment. Due to the nature of business in rendering service as far as waste management is concerned, the ME's and NME's are knowledgeable regarding the adequacy of waste reception facilities in workplaces.

5.2.3 Responses of ME's and NME's of all target groups regarding the availability of conveniently located waste disposal bins



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement posed to them: "The waste disposal bins are conveniently located" ($P > 0.05$) (Figure 5.2.3).

5.2.3.1 Contractors

The ME's and NME's overwhelmingly chose the options of "strongly agree" (28.0 and 40.9%, respectively) and "agree" (68.0 and 45.5%, respectively) for the statement: "The waste disposal bins are conveniently located" (Figure 5.2.3). Much less of the ME's (4.0%) and NME's (8.0%) chose the option of "unsure". A few of the ME's and NME's chose the options of "disagree" (0.0 and 5.7%, respectively) and "strongly disagree" (0.0 and 0.0%, respectively) (Figure 5.2.3).

In the Synchrolift dry dock there were demarcation for where the contractors are supposed to locate their waste reception facilities (Appendix D3). According to Raubex Construction (Pty) Ltd (2017) the environmental officers and/or specialists of the organisation (in this case contractors) should liaise with the supervisor on site to ensure that the waste reception facilities are located in the right locations, free from any obstructions for access. It should be noted that complaints are reported by the waste service providers if access to waste reception facilities are obstructed (Appendix D4). Such complaints are addressed by the organisation's management and actioned accordingly. Devi *et al.* (2020) argued that inconveniently placed waste reception facilities can cause unhappiness and negative impact on the environment. It is possible that the overwhelmingly positive ("strongly agree" and "agree") response percentages were influenced by the actions that are in place and taken to ensure that waste reception facilities are appropriately located. The responses for this question are an indication that the employees know that waste reception facilities must be conveniently located. In fact, they mostly agree that the waste reception facilities are conveniently located.

5.2.3.2 Tenants

The ME's and NME's overwhelmingly chose the options of "strongly agree" (36.7 and 29.3%, respectively) and "agree" (50.0 and 50.0%, respectively) for the statement: "The waste disposal bins are conveniently located" (Figure 5.2.3). Much less of the ME's (3.3%) and NME's (10.7%) chose the option of "unsure". A few of the ME's and NME's chose the options of "disagree" (6.7 and 7.9%, respectively) and "strongly disagree" (3.3% and 2.1%, respectively) (Figure 5.2.3).

The location of the waste reception facilities in the port environment is meant to be conveniently placed to allow access for port users without any obstruction (Republic of South Africa, 2005 & 2008a; TNPA, 2017a). These requirements, among others, are indicated to the tenants in their lease agreement with TNPA. The response percentages indicated a positive response from tenants regarding the location of waste disposal bins. The response percentages of ME's and NME's reveal the knowledge they have in understanding the requirements that the waste reception facilities must be conveniently located in their workplace.

5.2.3.3 *Transnet*

The ME's and NME's mostly chose the options of "strongly agree" (31.2 and 18.2%, respectively) and "agree" (45.5 and 45.1%, respectively) for the statement: "The waste disposal bins are conveniently located" (Figure 5.2.3). Much less of the ME's (11.7%) and NME's (14.5%) chose the option of "unsure". A few of the ME's and NME's chose the options of "disagree" (7.8 and 15.8%, respectively) and "strongly disagree" (3.9% and 6.4%, respectively) (Figure 5.2.3).

The Port of Cape Town provides waste reception facilities for operational activities. These waste reception facilities are positioned in a proper manner to allow free access to the port users without any difficulties (TNPA, 2015b; TNPA, 2017a; CEFAS, 2020; TNPA, 2020a). According to GES (2014) the waste management audit report stipulated that the port does indeed provide enough waste reception facilities in its operations. These waste reception facilities were also appropriately placed to gain easy access to them. Kinsley (2012) stated that in order to improve waste handling there should be enough practical waste disposal facilities in place. In the current study, the majority of ME's and NME's of Transnet response percentages suggest that they agree that the waste reception facilities are conveniently located. The waste management audit (GES, 2014; CEFAS, 2020) also suggest that waste reception facilities are conveniently placed.

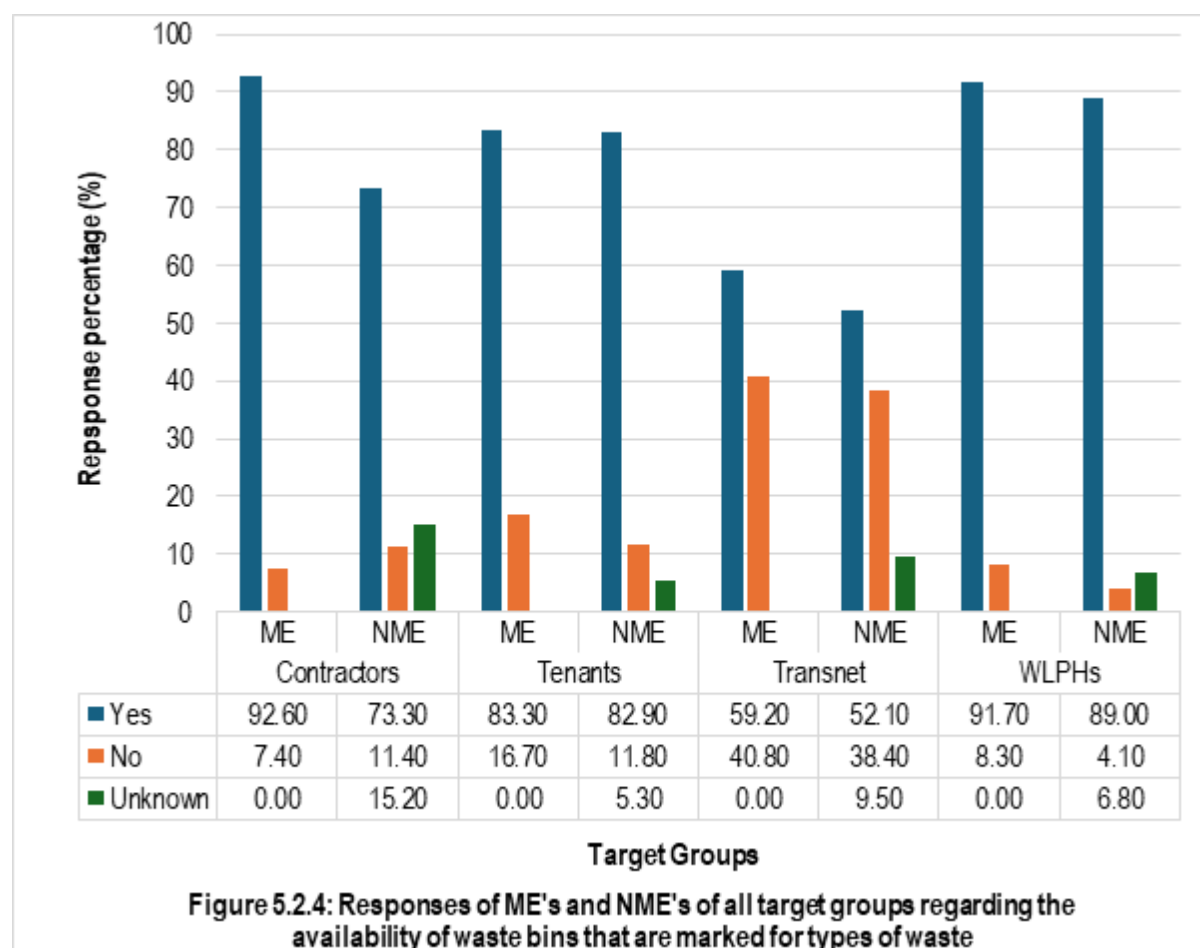
5.2.3.4 *WLPs*

The ME's and NME's overwhelmingly chose the options of "strongly agree" (20.0 and 49.2%, respectively) and "agree" (80.0 and 44.6%, respectively) for the statement: "The waste disposal bins are conveniently located" (Figure 5.2.3). Only a few NME's (4.6%) chose the option of "unsure". A few of the NME's chose the option of "disagree" (1.5%) (Figure 5.2.3).

The annual oversight audit report (TNPA, 2018b) of the ES revealed that the waste reception facilities were available and conveniently located. The nature of business requires convenient location of waste reception facilities for both customers and operational requirements (TNPA, 2016). The results from WLP ME's and NME's make sense since it is the function of these employees to make sure that waste

reception facilities are conveniently located (TNPA, 2018b; TNPA, 2016; Figure 5.2.3).

5.2.4 Responses of ME's and NME's of all target groups regarding the availability of waste reception facilities that are marked for types of waste



There were no statistical significant differences between the ME's from all the target groups with regards to waste reception facilities that are available at the work areas ($P > 0.05$) (Figure 5.2.4).

5.2.4.1 Contractors

The ME's and NME's overwhelmingly chose the option of "yes" (92.6 and 73.3%, respectively) for the statement: "The waste reception facilities are marked for types of waste" (Figure 5.2.4). Only NME's chose the option of "unknown" (15.2%) (Figure 5.2.4).

The majority of the contractors make use of the waste reception facilities (bins) hired from WLPH's for their operations. These waste reception facilities shall be clearly marked for the types of waste (DWAF, 1998; Naidoo, 2015; TNPA, 2017a&b; TNPA, 2022e; Appendix D5). A study done by Kingsley (2012) found that marked bins / reception facilities promote segregation of waste. They inform the users what to dispose in which waste reception facilities according to the labels. In the current study, the waste reception facilities that were available and labelled would have informed the contractor ME's and NME's responses to this question. This is an indication that the waste reception facilities were indeed labelled and that the ME's and NME's knew that these bins had to be labelled to comply with requirements (Naidoo, 2015).

5.2.4.2 Tenants

The ME's and NME's mostly chose the option of "yes" (82.90 and 92.1%, respectively) for the statement: "The waste reception facilities are marked for types of waste" (Figure 5.2.4). Only a few of the ME's and NME's chose the option of "unknown" (5.3 and 5.9%, respectively) (Figure 5.2.4).

The waste specifications of TNPA in waste management bidder document for the tender process indicates that waste reception facilities must be clearly marked and be visible for operational staff working at night (TNPA, 2017a&b). The majority of the tenants are supplied with waste reception facilities that are labelled for type of waste per facility/bin by the TNPA. This is a major contributing factor to the positive responses from respondents to the statement: "The waste reception facilities are marked for types of waste".

5.2.4.3 Transnet

The ME's and NME's chose the options of "yes" (59.2 and 52.1% respectively) and "no" (40.8 and 38.4% respectively) for the statement: "The waste reception facilities are marked for types of waste" (Figure 5.2.4). Only some NME's chose the option of "unknown" (9.5%) (Figure 5.2.4).

The TNPA waste specification in section 10.1 and 10.2 of the waste management bidder documents for the tender process for the Port of Cape Town states that the waste reception facilities (bins) must be clearly marked to the extent that even the staff

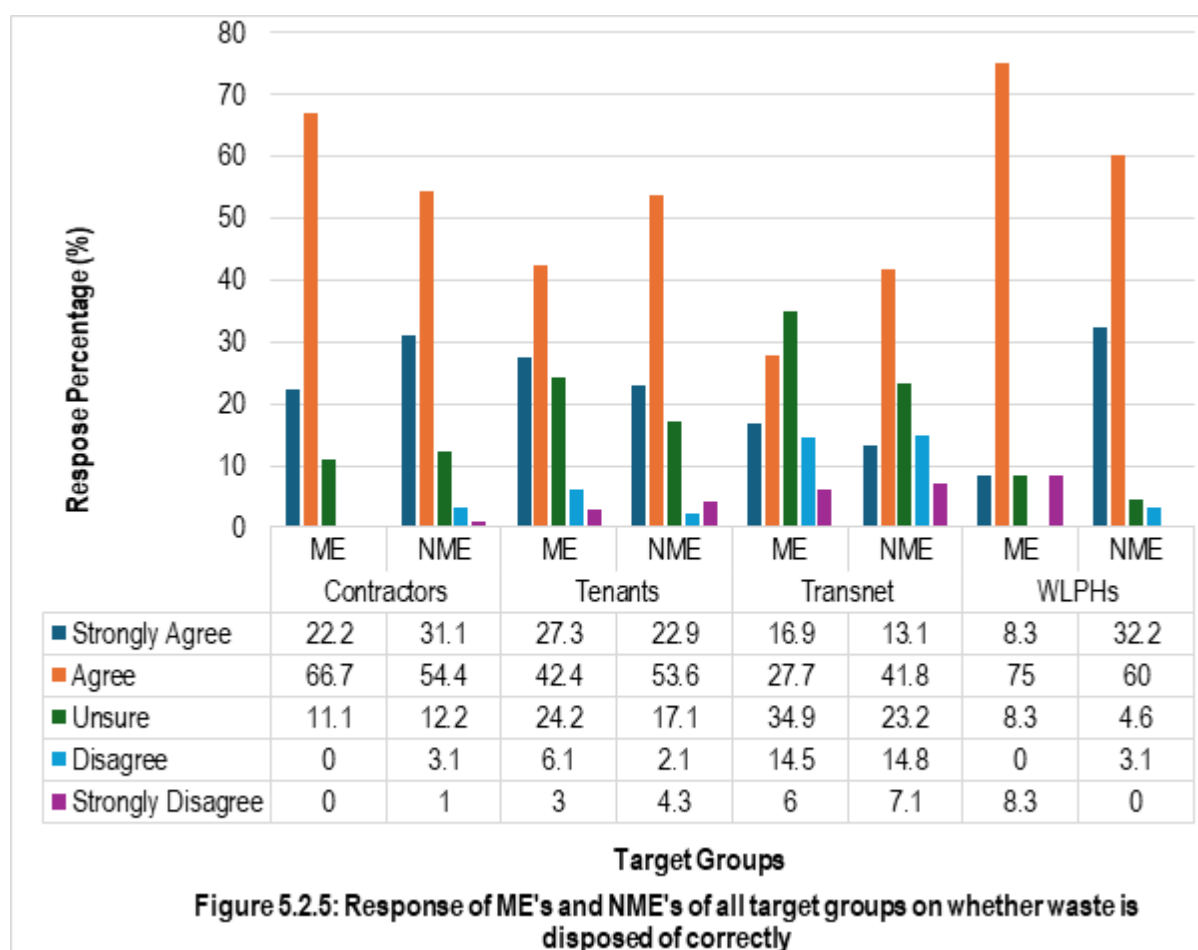
working night shift are able to see them (TNPA, 2017a&b). Furthermore, it was also observed that Transnet would also add their own waste reception facilities to help with operations of other port users. Some of the TNPA owned waste reception facilities / or bins were unlabeled compared to the hired ones (Appendix D7). According to the knowledge of Transnet employees, some waste reception facilities are labelled but others not.

5.2.4.4 WLPs

The ME's and NME's mostly chose the option of "yes" (91.7 and 89.0% respectively) for the statement: "The waste reception facilities are marked for types of waste". Only some of the NME's chose the option of "unknown" (6.8%) (Figure 5.2.4).

As was discussed in heading 5.2.4.1 (Contractors) WLP's are the suppliers of marked waste reception facilities for use by their clients. The TNPA requires that the suppliers of waste reception facilities must label those bins (TNPA, 2017a&b). Most of the companies in the port make use of the WLPs for management waste services. Because it is the core business of WLP's to supply labelled waste reception facilities to its clients it is not surprising the response percentages are so high (DWAF, 1998; Naidoo, 2015).

5.2.5 Responses of ME's and NME's of all target groups on whether waste is disposed of correctly



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement: "The waste is disposed of correctly" ($P > 0.05$) (Figure 5.2.5).

5.2.5.1 Contractors

The ME's and NME's mostly chose the options of "strongly agree" (22.2 and 31.1%, respectively) and "agree" (66.7 and 54.4%, respectively) for the statement: "The waste is disposed of correctly" (Figure 5.2.5). Much less of the ME's (11.1 %) and NME's (12.2 %) chose the option of "unsure". No ME's chose "disagree" or "strongly disagree". Only some NME's chose the option "disagree" (3.1 %) and "strongly disagree" (1.0%) (Figure 5.2.5).

All waste should have a safe disposal certificate that should be kept safe (Raubex Construction (Pty) Ltd, 2017; Republic of South Africa, 2008; DWAF, 1998). The environmental specialists of the contractors are responsible to ensure that waste is disposed of correctly and can be accounted for. The safe disposal certificates are also meant to be part of the SHE file as one of the returnable documents. Most of the MEs and NMEs indicated that they agreed that waste is disposed of correctly. Only a few chose “unsure”. It could be that this group is not aware of the process for the correct disposal of waste in their organisations. Sharing of information may be necessary so that this group may be knowledgeable of the correct disposal of waste in their organisation and the proof that validate the disposal.

5.2.5.2 Tenants

The ME’s and NME’s for the most part chose the options of “strongly agree” (27.3 and 22.9%, respectively) and “agree” (42.4 and 53.6%, respectively) for the statement: “The waste is disposed of correctly” (Figure 5.2.5). Some of the ME’s (24.2%) and NME’s (17.1 %) chose the option of “unsure”. A few of the ME’s and NME’s chose the options of “disagree” (6.1 and 2.1 %, respectively) and “strongly disagree” (3.0 and 4.3%, respectively) (Figure 5.2.5).

It is expected of the waste service providers (WLPH’s) to submit all the safe disposal certificates of the waste collected in the port premises to the TNPA and / or tenants on a monthly basis (TNPA, 2017a&b). An external audit report on waste management found that waste that is collected in the Port of Cape Town is appropriately disposed at the approved landfill site (CEFAS, 2020). Disposal certificates are provided to tenants by the TNPA at any time on request, especially those with contracts with the TNPA for waste collection services (Appendix D2). It is possible that the control measures put in place to comply with waste disposal requirements resulted in the positive response percentages of ME’s and NME’s of tenants. The majority of the MEs and NMEs are knowledgeable about the correct disposal of waste and feel that waste is disposed of correctly.

5.2.5.3 Transnet

The ME’s and NME’s chose the options of “strongly agree” (16.9 and 13.1%, respectively) and “agree” (27.7 and 41.8%, respectively) for the statement: “The waste

is disposed of correctly” (Figure 5.2.5). Other ME’s (34.9 %) and NME’s (23.2%) chose the option of “unsure”. A few of the ME’s and NME’s chose the options of “disagree” (14.5 and 14.8%, respectively) and “strongly disagree” (6 and 7.1 %, respectively) (Figure 5.2.5).

All the waste from the Port of Cape Town is meant to be disposed of as per the legislative requirements (Republic of South Africa, 2005 & 2008a; TNPA, 2015b & 2020a; Appendix D5). The waste service providers (WLPH’s) should ensure that all the disposal certificates are submitted to the TNPA SHE representative (in this case the Waste Contract Manager) monthly. Failure to provide safe disposal certificates by the service provider may result in non-payment (TNPA, 2017a&b). An external audit report on waste reception facilities and management found that waste that is collected in the Port of Cape Town is appropriately disposed at the approved landfill site (CEFAS, 2020). It is possible that the measures that are in place to ensure proper disposal of waste contributed to the response percentages. Therefore, majority of the MEs and NMEs were knowledgeable about the correct disposal of waste and were of the opinion that waste is correctly disposed of.

A number of responses indicated “unsure” (Figure 5.2.5). In heading 5.2.4.3 (*Transnet*), there were a few employees (ME’s & NME’s) in their view there were waste reception facilities which were not labelled (Figure 5.2.4). Furthermore, the external audit report of 2016, showed that there were areas in the Port of Cape Town where waste was not separated in the waste reception facilities (Advantage ACT, 2016). Hawkins (2006) indicated that unlabelled waste reception facilities promote mixed waste at the source. The waste which supposed to be recycled and other waste end up being disposed incorrectly as the results unlabelled waste reception facilities. These could lead to confusion. It could be possible that unlabelled waste reception facilities might be a contributing factor of “unsure” employees in the statement “the waste is disposed of correctly”.

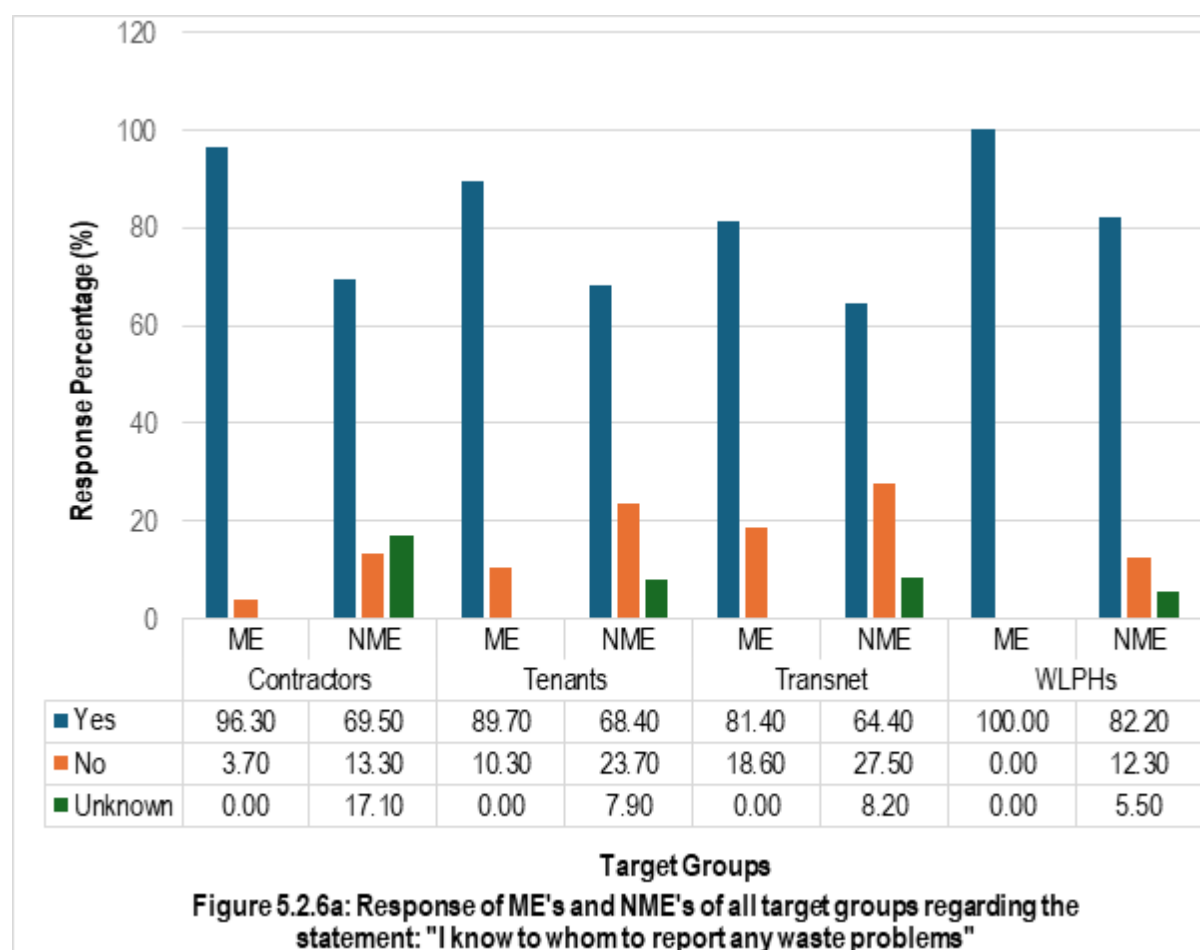
5.2.5.4 WLPH

The ME’s and NME’s for the most part chose the options of “strongly agree” (8.3 and 32.2%, respectively) and “agree” (75.0 and 60%, respectively) for the statement: “The waste is disposed of correctly” (Figure 5.2.5). Some of the ME’s (8.3%) and NME’s

(4.6%) chose the option of “unsure”. A few of the ME’s and NME’s chose the options of “disagree” (0.0 and 5.8%, respectively) and “strongly disagree” (8.3 and 0.0%, respectively) (Figure 5.2.5).

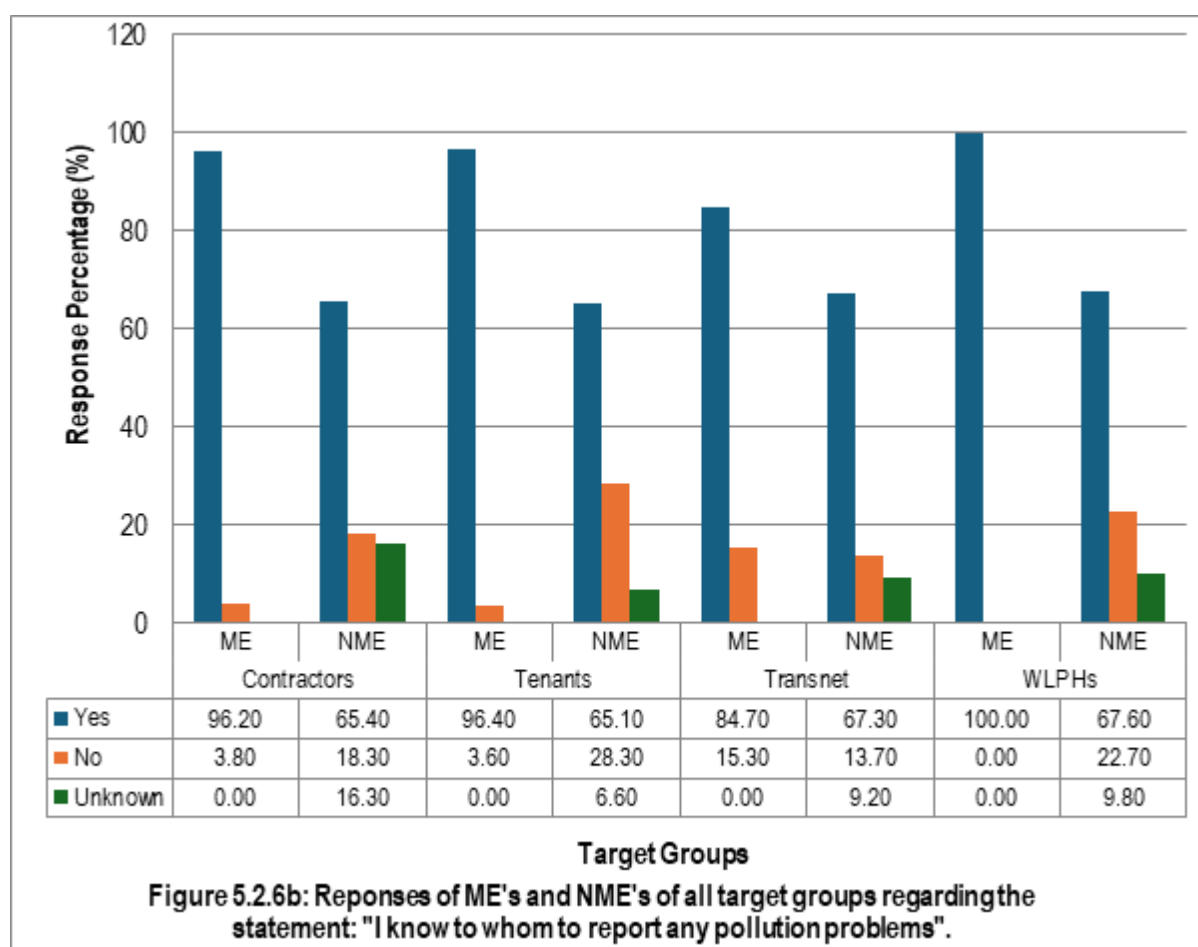
It is the responsibility of Transnet to ensure that before the waste license permits are issued to operate in the port environment, appropriate documentation is produced that the waste that will be collected from the port will be disposed in compliance with legal requirements (Republic of South Africa, 2005). All service providers must indicate where they will be disposing of the waste they handle and keep the proof of disposal certificates. Failure to produce documentation can result in criminal charges or fines (CCT, 2010b). The WLPs also provide the safe disposal certificate to their clients and keep the records for the waste disposed of in their operational activities (TNPA, 2015e). Therefore, it could be possible that the overwhelming positive response percentages were influenced by all the control measures and legal requirements expected from the waste service providers.

5.2.6a Responses of ME's and NME's of all target groups regarding the statement: "I know to whom to report any waste problems"



There were no statistical significant differences between the ME's and NME's from all the target groups with regards to the statement: "I know to whom to report any waste problems" ($P > 0.05$) (Figure 5.2.6a).

5.2.6b Responses of ME's and NME's of all target groups regarding the statement: "I know to whom to report any pollution problems"



There were no statistical significant differences between the ME's and NME's from all the target groups with regards to the statement: "I know to whom to report any pollution problems" ($P > 0.05$) (Figure 5.2.6b).

The uncertainty of the "unknown" response may be interpreted as a negative response and can be considered to be closer to a "no" response than a "yes" response, or even an indication of a certain level of ignorance.

5.2.6.1 Contractors

The ME's and NME's overwhelmingly chose the "yes" option (96.3 and 69.5% respectively) for the statement: "I know to whom to report any waste problems". Only a few NME's chose the option of "unknown" (17.1%) (Figure 5.2.6a).

The ME's and NME's overwhelmingly chose the option of "yes" (92.6 and 73.3% respectively) for the statement: "I know to whom to report any pollution problems". Only some of the NME's chose the option of "unknown" (16.3%) (Figure 5.2.6b).

The majority of ME's and NME's known to whom report any waste and pollution problems. Every contractor appointed to do the work in the Port of Cape Town is subjected to a safety, health and environmental (SHE) induction programme as indicated in heading 4.2.1 of Chapter 4. The RS of the TNPA conduct this induction to all contractor employees. Included in the SHE induction programme is reporting. All the incidents must be immediately reported to supervisors and SHE representatives of the organisation before the end of the shift (Republic of South Africa, 1998a&b & 1993; TNPA, 2015b & c). The SHE department of Transnet may also be approached for reporting purposes. This reporting procedure may also be used by all employees to report waste and pollution related problems (TNPA, 2016; TNPA, 2015a&b). These existing reporting mechanisms may have contributed to the response percentages of the ME's and NME's. This means that most of the respondents are knowledgeable in terms of reporting of waste and pollution problems. Though the contractors NME's may further improve from the current status for better.

5.2.6.2 Tenants

The ME's and NME's mostly chose the "yes" option (89.7 and 68.4% respectively) for the statement: "I know to whom to report any waste problems". Only very few of the NME's chose the option of "unknown" (7.9%) (Figure 5.2.6a).

The ME's and NME's overwhelmingly chose the "yes" option (96.4 and 67.3% respectively) for the statement: "I know to whom to report any pollution problems". Very few of the NME's chose the option of "unknown" (6.6%) (Figure 5.2.6b).

To a large degree the ME's and NME's knew to whom to report any waste and pollution problems. The drafting and implementation of the EMP's for the tenants reside with the environmental specialist and / or environmental officer as part of their job description. Due to their job description any challenge related to safety, health and environment is reported to them as well as to the SHE representative in the organisation (Republic of South Africa, 1993, 1998a, 2005; TNPA, 2015b & c; DCD

Dorbyl Marine Cape Town (Pty) Ltd, 2016). During annual audits, the TNPA ES check if the names and contact details of the Environmental Specialist / Officers and SHE representatives of the tenants are published or advertised at the workplace. (TNPA, 2018a). Printed notices on notice board are effective tools to communicate with employees in the workplace and helps to keep them informed (Rodrigues, 1992; Vecchio-Sadus, 2007; Ruangrojvichai & Rimkeeratikul, 2012). Most matured organisations appoint environmental managers as key role players to oversee environmental management matters (Manuti *et al.*, 2015; Lai, 2016; Seidel-Sterzik, 2018). It is possible that these measures described above may have contributed to the positive response percentages of the ME's and NME's. Therefore, the tenant ME's and NME's have knowledge to whom to report waste and pollution problems.

5.2.6.3 Transnet

The ME's and NME's overwhelmingly chose the option of "yes" (81.4 and 64.4% respectively) for the statement: "I know to whom to report any waste problems". Only 8.2% of the NME's chose the option of "unknown" (Figure 5.2.6a).

Most of the ME's and NME's chose the "yes" option (81.7 and 64.4% respectively) for the statement: "I know to whom to report any pollution problems". Only a few of the NME's chose the option of "unknown" (9.2%) (Figure 5.2.6b).

To a large degree the ME's and NME's of Transnet knew to whom to report waste and pollution problems. Every department of the Port of Cape Town has a waste champion. These waste champions, among other responsibilities, are to report any waste related matters to the ES and the SHE department secretary (TNPA, 2020a). The pollution control team in the Port Engineering Department also receives and responds to calls about waste and pollution related problems in the Port of Cape Town (TNPA, 2015a; TNPA, 2022e).

In the Port of Cape Town, a mouse pad contacts initiative was adopted where key contacts were printed on computer mouse pads and distributed amongst employees. This made it easy for employees to know to whom waste and pollution problems were to be reported to (Appendix D8). Key contact numbers were also posted on notice boards for those who may not have computers and work outside (Appendix D9).

It seems as if the arrangements for waste champions in every department are playing a positive role in the reporting of waste and pollution-related problems, as is evident from the positive response percentages. Furthermore, key contact persons for reporting are also included in the integrated waste management plan of the TNPA (IWMP) (TNPA, 2020a). The above-mentioned factors all contributed to the responses from employees that is reflecting a sense that they know to whom waste and pollution problems must be reported to. However, there is still room for improvement.

5.2.6.4 WLPs

The ME's and NME's overwhelmingly chose "yes" (100 and 82.2% respectively) for the statement: "I know to whom to report any waste problems". Only a few NME's chose the option of "unknown" (5.5%) (Figure 5.2.6a).

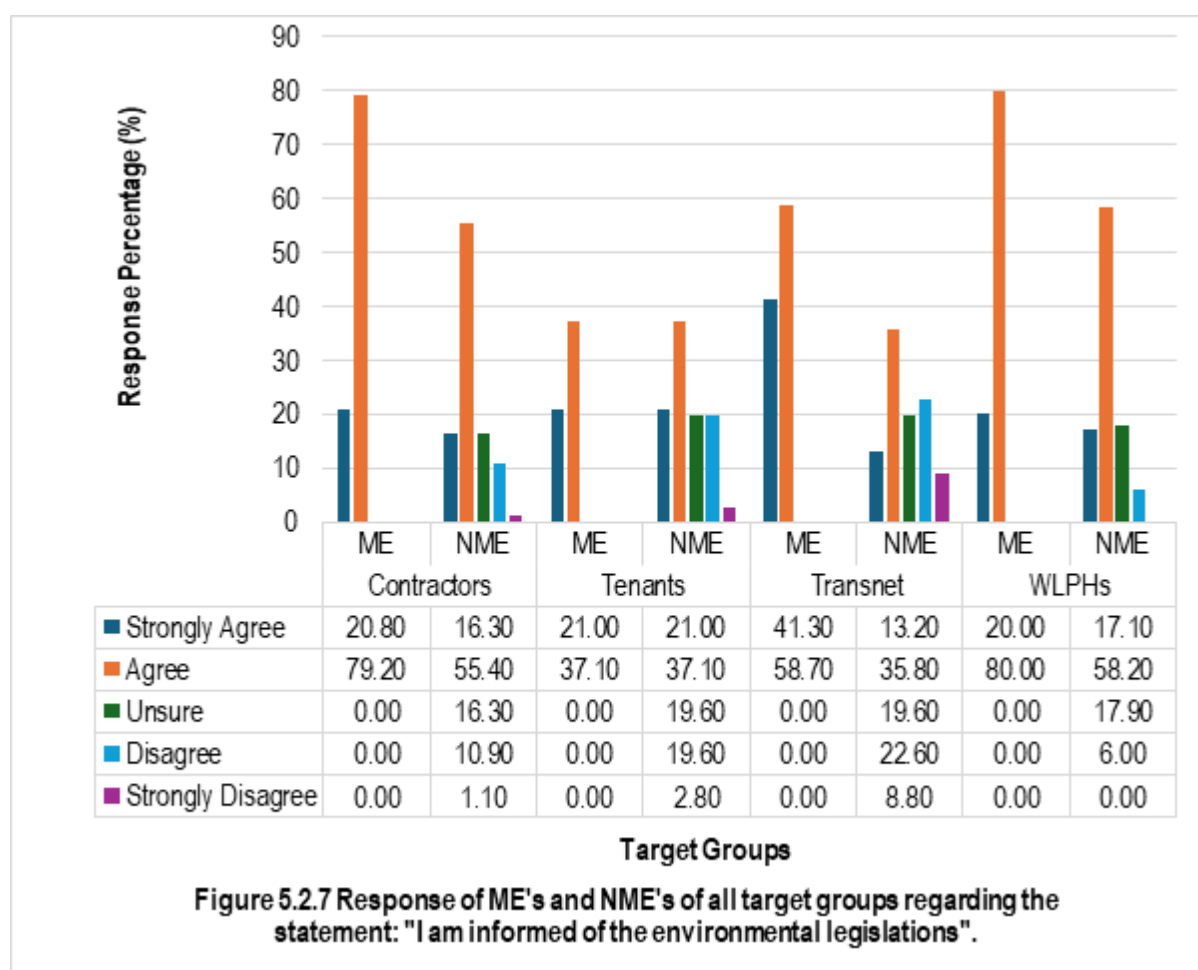
The vast majority of the ME's and NME's chose "yes" (100 and 67.6% respectively) for the statement: "I know to whom to report any pollution problems". Only 9.8% of the NME's chose the option of "unknown" (Figure 5.2.6b).

It is quite clear that the majority of the ME's and NME's know to whom to report any waste and pollution problems. In the WLPs sector waste and pollution-related problems are reported to Supervisors and the Environmental Officers and / or Specialists of the organization. There are also monthly SHE meetings where the SHE representatives provide feedback on inspections carried out during operations. More often the employees use these opportunities to report waste and pollution related matters to the SHE representatives (Swift Tank and Oil Solution, 2015). According to the audit reports conducted by TNPA ES, not all the WLPs had notice boards with key contact personnel indicating to whom reportable matters should be reported to including pollution problems (TNPA, 2019b). In other reports it was indicated that SHE representative were not conducting their inspections as required by law according to Occupational Health and Safety Act (No. 85 of 1993) (TNPA, 2018a; TNPA, 2016; TNPA, 2015e; Republic of South Africa, 1993). Although there are challenges, it seems as if employees know to whom waste and pollution problems must be reported.

5.2.6.5 Interviews with City of Cape Town

The interview conducted with the Solid Waste Management Department of the City of Cape Town dealt amongst other with reporting of pollution problems. It revealed that there contact personnel for information and reporting of waste and pollution matters.

5.2.7 Responses of ME's and NME's of all target groups regarding the statement: "I am informed of the environmental legislations"



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement: "I am informed of the environmental legislations" ($P > 0.05$) (Figure 5.2.7).

5.2.7.1 Contractors

The ME's and NME's mostly chose the options of "strongly agree" (20.8 and 16.3%, respectively) and "agree" (79.2 and 55.4%, respectively) for the statement: "I am informed of the environmental legislation" (Figure 5.2.7). Only NME's chose the option of "unsure" (16.3%), "disagree" (10.9%) and "strongly disagree" (1.1%) (Figure 5.2.7).

Most of the ME's and NME's seems to be informed of relevant environmental legislation. The environmental officer is appointed in the organisation to ensure that environmental functions are executed. This includes, among other functions, on

advising on environmental legislation (Thornton, 1995; Stewart, 1999; Wessels *et al.*, 2018). Chrode Solutions (Pty) Ltd (2019) indicated that toolbox tools were used as opportunities to engage with employees as far as environmental legislation requirements are concerned in terms of implementing daily activities. It is thus possible that the functions of the Environmental Specialists and / or Officers contributed to the response percentages from the ME's and NME's. The respondents seem to have knowledge with regards to environmental legislations.

In terms of the contract Transnet procurement procedure manual of 2015, contractors may subcontract any of their work (PPM, 2015). This may result in a gap in communication between the subcontractor and the Environmental Specialist (ES) and Risk Specialist (RS) which may result in subcontractor employees not being aware of all the relevant environmental legislations. This may, at least partly, explain the “unsure” responses.

5.2.7.2 Tenants

Most of the ME's and NME's chose the options of “strongly agree” (41.7 and 21%, respectively) and “agree” (58.3 and 37.1%, respectively) for the statement: “I am informed of the environmental legislations” (Figure 5.2.7). Only NME's chose the option of “unsure” (19.6%), “disagree” (19.6%) and “strongly disagree” (2.8%) (Figure 5.2.7).

In legal requirements affecting the environment, it is the responsibility of the appointed Environmental Specialists and / or Officers to provide necessary guidance as far as environmental legislation is concerned to the organisation (Republic of South Africa, 1998a; Greenwood *et al.*, 2012; Wasteman Holdings, 2013; Wessels, 2015). It was also indicated in heading 4.2.5.2 (Tenants) that in some cases not all the employees attend stakeholder collaboration programmes. One reason for this is that operational activities must always continue. Therefore, all employees cannot be allowed to attend these collaboration programmes at the same time. However, information is shared with those who were unable to attend. In these stakeholder collaborations, any updates as far as environmental legislation is concerned is addressed (Scott & Oelofse, 2005; Makokotlela, 2016). It is possible that the execution of functions of the

Environmental Specialists and / or Officers, and also the stakeholder collaboration programmes influenced the response percentages of ME's and NME's.

A concerning result is that 19.6% of NME's indicated that they are "unsure" whether they are informed of environmental legislation. This could possibly be a result of the operation requirements not allowing all employees to attend the collaboration programmes at the same time. Those that did not attend may end up missing the opportunity of not getting knowledge if feedback session platform is not created, about the environmental legislation. Ford (1996) argued that feedback is one of the important factors of the environment. Gong & Zhang (2017) suggest that feedback has the potential to influence employee positively and eventually increase their performance in operations. Failure to provide a feedback platform to the entire team, may result in uncertainty as expressed by the "unsure" responses.

5.2.7.3 Transnet

The ME's and NME's chose the options of "strongly agree" (41.3 and 13.2%, respectively) and "agree" (58.7 and 35.8%, respectively) for the statement: "I am informed of the environmental legislations" (Figure 5.2.7). Only NME's chose the option of "unsure" (19.6%), "disagree" (22.6%) and followed by "strongly disagree" (8.8%) (Figure 5.2.7).

As it was indicated in heading 4.2.5.3 (Transnet), other collaborative training programmes have also been conducted together with outside stakeholders, such as the South African Maritime Safety Authority (SAMSA) and the Department of Transport (DoT) where training workshops were provided on environmental protection procedures and new regulation requirements, among others (SAMSA, 2019; SAMSA, 2019/2020). Furthermore, it is the two ES's function at the Port of Cape Town to guide and advice the port on environmental legislations. These two staff members are involved in most of the projects of Transnet to advice on environmental requirements as part of a Cross Functional Sourcing Team (CFST). For them to be part of the CFST, they are appointed as advisors on environmental issues, including legal requirements (Appendix D10). The Transnet internal audit (TIA) report of 2014 revealed that the function of the port ES's are in reality reactive rather than proactive. The root cause seems to be a lack of human resources and excessive responsibilities within the port

environment (TIA, 2014). This leads to a situation where functions are sometimes compromised. For example, less environmental seminars, workshops and symposiums are presented to employees (TIA, 2014; Appendix D11). It is possible that the collaborations with outside stakeholders and the involvement of ES's in CFST projects may have had a positive impact on the response percentages as far as an environmental legislation was concerned, although some challenges were identified as described above. These challenges could have led to some respondents choosing the “unsure”, “disagree” and “strongly disagree” options. Therefore, as far as Transnet employees are concerned there is room for improvement with regards to being informed of environmental legislation, since about half of the NME respondents did not provide positive responses.

The TIA 2014 report further identified a gap, in EXCO meetings; that environmental aspects are not addressed in the agenda of the top management. This report recommended that environmental aspects and associated legislation be included on the EXCO agenda (TIA, 2014). If top management is not made aware of the legislation requirements and changes, how will the employees know what is it required of them? It is thus possible that the ‘unsure’ and “disagree” have influenced by the absence of environment component in the top management agenda. Recently, it was discovered that the top management agenda specifically include environmental legislation (Appendix D14).

5.2.7.4 WLPs

The ME's and NME's mostly chose the options of “strongly agree” (20.0% and 17.1%, respectively) and “agree” (80.0 and 58.2%, respectively) for the statement: “I am informed of the environmental legislations” (Figure 5.2.7). Only NME's chose the option of “unsure” (17.9.%) and “disagree” (6.0%). (Figure 5.2.7).

It was indicated in heading 4.2.5.4 (Waste Licence Permit Holders) that the government from time to time organise workshops and / seminars for industries in relation to environmental legislations (Berkowitz *et al.*, 2003; Makokotlela, 2016; Vogel *et al.*, 2016). The WLPs has been supporting these events with their attendance and contributions (DEA, 2019/20; DEA, 2014/5; Appendix D11). These seminars and / workshops could have influenced the knowledge of ME's and NME's for being

informed of the environmental legislations as evident from their overwhelming positive response percentages. It can be concluded that the ME's and NME's of the WLPH are informed and have knowledge as far as the environmental legislation is concerned.

5.2.7.5 Interviews with City of Cape Town

An interview was conducted with the Solid Waste Management Department of the City of Cape Town. The following question was posed: According to you, how knowledgeable are Port of Cape Town users with regards to the management of waste and pollution?

The responses were: *"There is a lack of knowledge / awareness in the following:"*
"Relevant and legal requirements for waste and pollution management".

Other responses were:

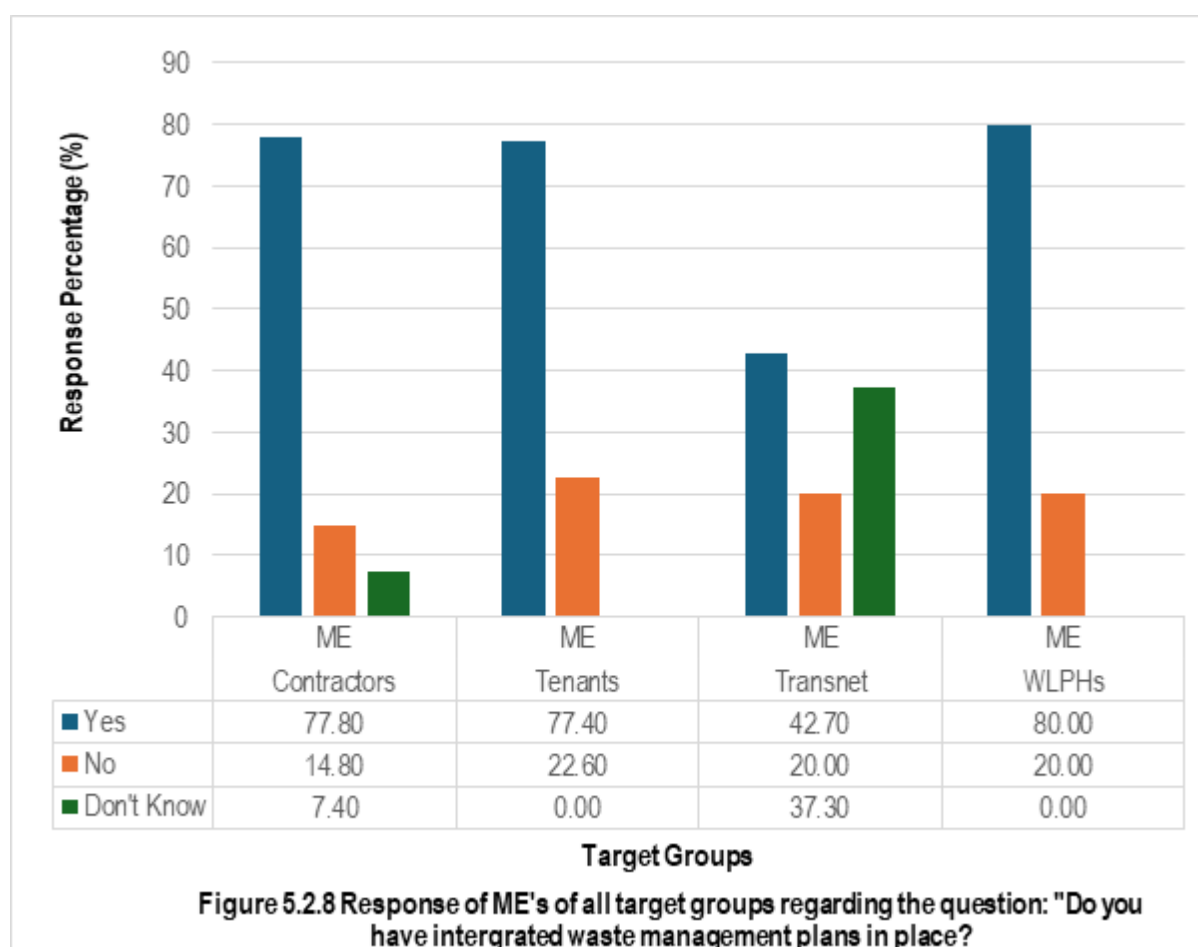
"Authorities is responsible for various waste media and compliance requirements"

"Waste disposal route once it leaves the port and potential legal risks by the port and management"

"Risk for Transnet as they lease the land and potential pollution caused by tenants to section 30 and 28 of (NEMA) requirements".

Their responses seem to stand in contrast to some degree to those of the other target groups of this study. The response from the local government shows that they feel that there is a lack of knowledge concerning relevant legal requirements by port users. There seem to be a disconnect between what local government thinks of port user's environmental legislation knowledge and what the port users think they knew with regards to environmental legislations. This gap needs to be closed.

5.2.8 Responses of ME's of all target groups regarding the question: "Do you have integrated waste management plans in place?"



There were no statistical significant differences between the ME's from all the target groups with regards to whether integrated waste management plans (IWMP's) are in place ($P > 0.05$) (Figure 5.2.8). The uncertainty of the "don't know" response may be interpreted as a negative response and can be considered to be closer to a "no" response than a "yes" response, or at least as a sign of ignorance. If there were integrated waste management plans (IWMP's) in place it would have been known to the ME's respondents.

5.2.8.1 Contractors

The ME's overwhelmingly chose the option of "yes" (77.8%). Much less chose "no" (14.8%). Only a few ME's chose the option of "don't know" (7.4%) (Figure 5.2.8).

Most of the respondents thus indicated that they have integrated waste management plans (IWMP's). It should be considered that the waste of contractors is normally managed by WLPH's. The contractors subcontract WLPH's to manage waste-related issues on their behalf. The WLPH's then develop integrated waste management plans aligned with the contractors' plans. This forms part of the returnable documents for submission with the SHEP file for the TNPA's approval. The Environmental Specialists and / or Officers work closely with the WLPH representatives for the implementation of the IWMP. On request the TNPA share their IWMP with any organisation (TNPA, 2020a). It could be possible that these measures that are in place influenced the response percentages of the ME's in a positive way.

Very few of the ME's chose "no" (14.8%) and "don't know" (7.4%). More often during the induction phase before work activities in the port commence, not all the managers attend the sessions. Some managers join the project at a later stage depending on the work activities at that time. Therefore, some managers may miss the initial induction programmes and not be aware of the IWMP. There may be a need to introduce the IWMP to contractor managers as they join the activities in the port.

5.2.8.2 Tenants

The ME's chose the options of "yes" (77.4%) and "no" (22.6%) for the statement: "Do you have integrated waste management plans in place (Figure 5.2.8).

Many of the tenants submit integrated waste management plans to the property department as part of requirements. This document is one of the returnable documents that must be submitted to the TNPA property department during the leasing agreement (Republic of South Africa, 2005). This document will be assigned to an ES of TNPA for approval. Furthermore, during the annual oversight audits, as indicated in heading 3.2.4 (Tenant responses (ME's and NME's) concerning environmental awareness programmes), the auditor also verifies the implementation of the IWMP. In the oversight report of 2015, the report stipulated that the IWMP were in place and implemented (TNPA, 2015a&e). At the time of data collection, not all tenants have completed their IWMP's. This may have contributed to the "no" response. This was also a finding of the oversight report of 2015 (TNPA, 2015e).

5.2.8.3 *Transnet*

The ME's mostly chose the "yes" option (42.7%) for the question: "Do you have integrated waste management plans in place?" (Figure 5.2.8). 37.3% of ME's indicated "don't know", while 20.0% chose the "no" option (Figure 5.2.8).

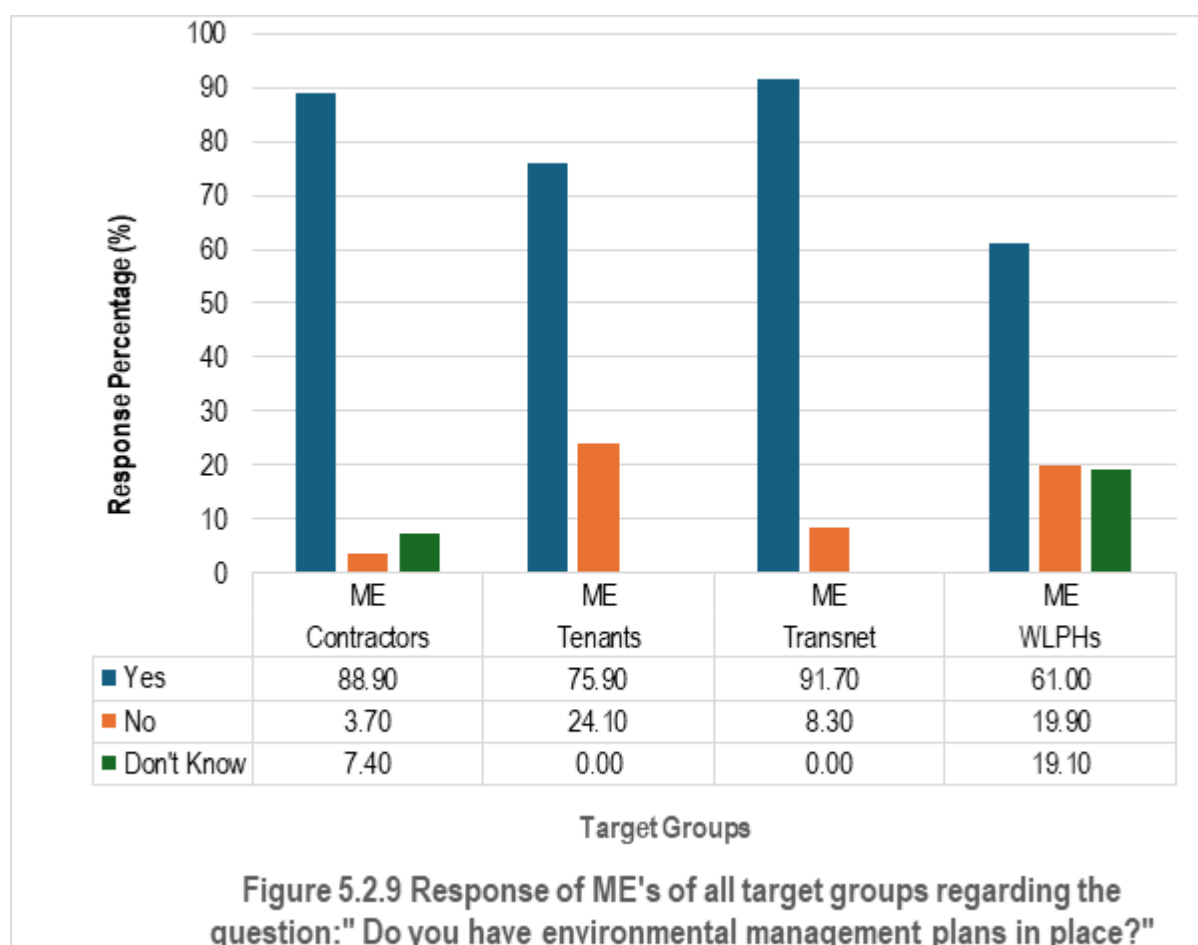
The Port of Cape Town has an IWMP. This IWMP is available for TNPA employees and as well as any organisation interested in the plan (TNPA, 2020a). The GES (2014) audit report of the Port of Cape Town stipulated that the IWMP was in place at the time of the audit; however, the IWMP was deemed to be outdated. This audit report also indicated that the plan was poorly communicated to the employees of the Port of Cape Town (GES, 2014). A new plan was created by the port ES and signed off by the SHEQ Portfolio Manager in 2015. A further updated IWMP was adopted in 2020 (TNPA, 2015a & 2020a). Although the IWMP was updated, it is still unclear if the IWMP was effectively communicated to all the employees, as was reported by GES (2014). This may account for the "no" (20.0%) and "don't know" (37.3%) responses. There may be a need for Transnet to address this gap to reduce or even eliminate ignorance with regards to the IWMP.

5.2.8.4 *WLPs*

The ME's of WLPs mostly chose the "yes" option (80.0%) for the question: "Do you have waste integrated management plans in place?" (Figure 5.2.8). The "no" option was chosen to a lesser degree by the ME's (20.0%) (Figure 5.2.8).

The IWMP is one of the returnable documents that must be submitted to both the City of Cape Town and TNPA as per the requirements (Republic South Africa, 2005; CCT, 2010b;). Without the submission of the IWMP, waste license permits cannot be issued (Republic South Africa, 2005; CCT, 2010b; Appendix G2). Furthermore, implementation in the organisation is the role of the Environmental Specialist and / or Officers. However, it seems as if 20% of ME's is not aware or have knowledge of the existence of the IWMP in their own organisation. This may be due to a lack of communication from the SHE team of that particular WLP. Not all ME's work directly with the IWMP. However, this seems to not always happen.

5.2.9 Responses of ME's of all target groups regarding the question: "Do you have environmental management plans in place?"



There were no statistical significant differences between the ME's from all the target groups with regards to whether environmental management plans (EMP's) are in place ($P>0.05$) (Figure 5.2.9).

The uncertainty of the "don't know" response may be interpreted as a negative response and can be considered to be closer to a "no" response than a "yes" response and even point to some level of ignorance.

5.2.9.1 Contractors

The ME's of contractors mostly chose "yes" (88.9%) for the question: "Do you have environmental management plans (EMPs) in place?" (Figure 5.2.9). It was also revealed that 7.4% of the ME's chose the "don't know" option, while only 3.7% chose the "no" option (Figure 5.2.9).

The vast majority of contractors thus seem to have EMP's in place. The EMPs are part of the returnable documents for the approval of the SHEP file, as showed in heading 3.2.4 (*The contractors' responses (ME's and NME') concerning environmental awareness programmes*) (TNPA, 2015b). Most organisations appoint Environmental Specialists and / or Officers. These staff members ensure that EMPs are in place, implemented and monitored (Republic of South Africa, 1998a; Melnyk *et al.*, 2003; Reed, 2008; DCD Dorbyl Marine Cape Town (Pty) Ltd, 2016; Chand Environmental Consultants, 2019; Battersby, 2022). All the employees are expected to adhere to the requirements of the EMP specifications. A copy of the EMP is kept on site at the contractor's site office and should be made available at any time to all contractor staff, port users, tenants and regulatory authorities, upon request (Republic of South Africa, 2017; TFR, 2015). It is possible that the fact that EMPs is part of the returnable documents for the approval of SHEP files and that Environmental Specialists and / or Officers in those organisations should ensure the implementation of EMP's, positively influenced the responses of the ME's. The EMP is part of the SHE files submission to the TNPA. It should not be possible that some contractors do not have EMP's, as implied by the "no" responses, unless those respondents do not know about the EMP. This can be due to ME's getting involved in work activities in the port after the EMP was approved.

5.2.9.2 Tenants

The ME's of tenants mostly chose "yes" (75.9 %) for the question: "Do you have environmental management plans (EMPs) in place?" (Figure 5.2.9). The results also revealed that 24.1% of the ME's chose the "no" option (Figure 5.2.9) to the knowledge of the respondents, most of the tenants therefore have environmental management plans (EMP's).

As stipulated in heading 5.2.6.2 (Tenants) the organizational Environmental Specialists and / or Officers are responsible for the implementation of the EMP's (DCD Dorbyl Marine Cape Town (Pty) Ltd, 2016; Republic of South Africa, 2017; Thomas, 2018; Erasmus, 2023). This plan is one of the returnable documents that must be submitted to the TNPA property department during the lease agreement. These EMPs are then assigned to the ES of TNPA for approval. The ES also verifies the EMP implementation and provide feedback. In the TNPA annual report of 2015 it is indicated

that the EMPs of tenants were in place and implemented (TNPA, 2015e; Appendix D12). It should be noted that not all the tenants can be audited within a year by the ES due to a lack of human resources. As a result of challenges to audit all tenants, some of the tenants may not comply fully with requirements such as EMP'S. This may be a contributing factor why 24.1 % of respondents indicated that they do not have EMP's.

5.2.9.3 Transnet

The ME's mostly chose the "yes" option (91.7%) for the question: "Do you have environmental management plans (EMPs) in place?" (Figure 5.2.9).

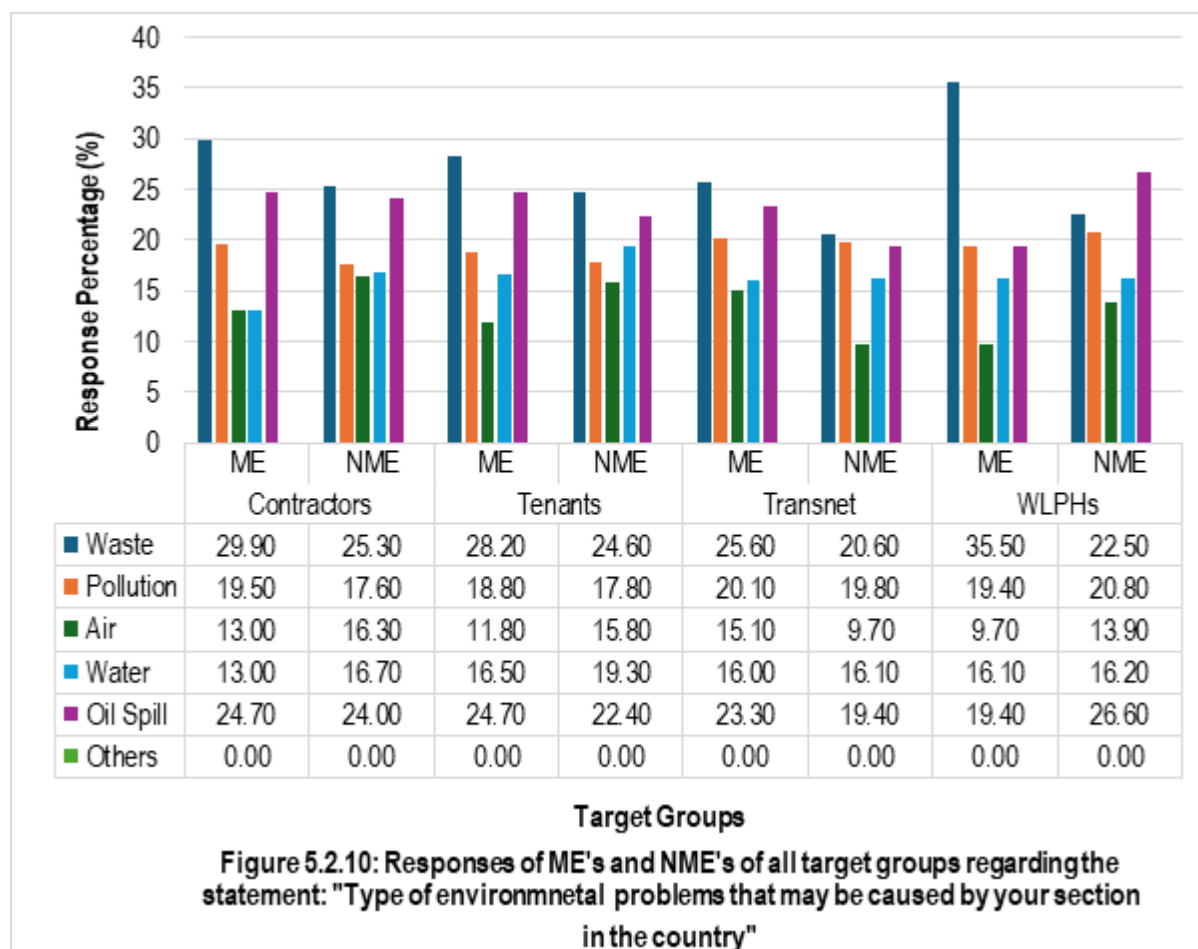
Only 8.3% of ME's chose the "no" option (Figure 5.2.9). Therefore, at least according to the respondents the Port of Cape Town has an environmental management plan in place (TNPA, 2014e; TNPA, 2015f). The generic EMP for the Port of Cape Town was approved by the then Department of Environmental Affairs (currently known as the Department of Environmental Fisheries and Forestry (DEFF) (Lochner, 2005; DEAT, 2004; Republic of South Africa, 1998a). It is the responsibility of TNPA to ensure that everyone involved in the maintenance and constructions related activities are made aware and receive a copy of the environmental management plan (EMP) to ensure compliance (Transnet SOC Ltd, 2020; TNPA, 2020c). All the contracts appointed by TNPA to do certain projects within the ports is subjected to EMPs for compliance. The Environmental Specialists and / or Officers should ensure that the EMPs are implemented in the Port of Cape Town (Republic of South Africa, 1998a; Carruthers & Tinning, 2003; TNPA, 2015b, d & f; Liebenberg-Enslin, 2017). The environmental management plan (EMP) is binding on all parties and is enforceable at all levels of operation and operational management within the port (TPT, 2012; Kuznetsov *et al.*, 2015; Teerawattana & Yang, 2019). It is therefore not surprising that the vast majority of the ME's responded positively on the issue of having EMP's. Only 8.3% of ME's indicated that there is no EMP in place. This could be because they are not aware of the EMP because it does not form part of their main job function. However, all employees should be aware of the EMP. Therefore, this is a matter to be addressed by the TNPA.

5.2.9.4 WLPs

The ME's of WLPs mostly chose the "yes" option (61.0%) when responding to the question: "Do you have environmental management plans (EMPs) in place?" (Figure 5.2.9). The "no" option was chosen to a lesser degree by the ME's (19.9%), while the "don't know" option was chosen by the 19.1% of the ME's (Figure 5.2.9).

It seems like most WLPs have an environmental management plan (EMP) in place, as far as the ME's are aware. The EMPs provide guidance and direction on environmental matters to all responsible parties in the organisation (Hossain *et al.*, 2021; Chand Environmental Consultants, 2019; Republic of South Africa, 1998a). It is the responsibility of the SHE Manager to ensure that the EMPs are in place and implemented (Officer, 2009; Portion *et al.*, 2016). More often there are instances where WLPs SHE Manager also fulfils the role of Environmental Specialist and / Officers. It is possible that the SHE Manager may not have communicated and shared the EMP with other MEs because they may not be directly involved in, SHE related matters. This could be a barrier that may have led to the "no" and "unknown" responses.

5.2.10 Responses of all target groups (ME's and NME's) regarding the types of environmental problems that may be caused by their section in the company



There were no statistical significant differences between the ME's and NME's from all the target groups with regards to the types of environmental problems that may be caused by their section in the company ($P > 0.05$) (Figure 5.2.10).

5.2.10.1 Waste and oil spill

The contractor ME's and NME's gave the highest response percentages for "waste" and "oil spill" in terms of the types of environmental problems that may be caused by their section in the company. The contractor ME's gave 29.9% to "waste" and 24.7% to "oil spill". The NME's gave 25.3% to "waste" and 24.0% to "oil spill" (Figure 5.2.10). The tenant ME's gave response percentages of 28.2% for "waste" and 24.7% for "oil spill". Tenant NME's gave 24.6% for "waste" and 22.4% for "oil spill" (Figure 5.2.10). Transnet ME's gave 25.6% for "waste" and 23.3% for "oil spill", while the

NME's gave 20.6% for "waste" and 24.5% for "oil spill" (Figure 5.2.10). WLPH MEs gave 35.5% for "waste" and 19.4% for "oil spill." Their NME's gave 22.5% for "waste" and 26.6% for "oil spill" (Figure 5.2.10).

All the operational activities of the contractors, tenants, Transnet and WLPHs are identified and listed in relation to their negative impact to the environment. In these identified activities detailed written procedures are indicated to ensure that the identified activities are properly controlled. Every effort is made to lessen the impact of the operations on the environment, and to empower the employees with knowledge (Republic of South Africa, 1998b; Dinwoodie *et al.*, 2012a; Raubex Construction (Pty) Ltd, 2017; Swift Tank and Oil Solution, 2019; Transnet SOC Ltd, 2020). The incorrect storage, handling and disposal of both waste and accidental spillage of hazardous substances, such as oil, may result in environmental harm. Necessary training and awareness should therefore be provided to all the employees (ROSE Report, 2012; Golder Associates 2020). According to the results of this study "oil spills" and "waste" are two of the most prominent environmental problems that may arise due to companies' activities. The mitigation measures include training and raising of awareness regarding matters of oil spills and waste. As indicated in headings 3.2.4.1, 3.2.5.1, 3.2.6.1, 3.2.7.1, 4.2.1.1, 4.2.2.1, 4.2.3.1, and 4.2.4.1 waste and oil spill related awareness and training programmes were found to be the highest in terms of response percentage for ME's and NME's of all target groups. There seems to a link between the ME's and NME's perceived environmental risk of "waste" and "oil spill" and the training and awareness programmes offered to employees.

5.2.10.2 Pollution and water

The contractor ME's gave 19.5% for "pollution" and 13.0% for "water" while the NME's gave 17.6% for "pollution" and 16.7% for "water" (Figure 5.2.10). The tenant ME's gave 18.8% for "pollution" and 16.5% for "water." The tenant NME's gave 17.8% for "pollution" and 19.3% for "water" (Figure 5.2.10). The Transnet ME's gave 20.1% for "pollution" and 16.0% for "water" and their NME's gave 19.8% for "pollution" and 18.2% for "water" (Figure 5.2.10). The WLPH ME's gave 19.4% for "pollution" and 16.1% for "water" while the NME's gave 20.8% for "pollution" and 16.2% for "water" (Figure 5.2.10).

All the target groups of the ME's and NME's indicated "pollution" and "water" as the second highest types of environmental problems that could result from activities in their sections. All operational activities should be identified so that the necessary control measures can be put in place to eliminate the impact to the environment, while training and awareness programmes are provided to the employees (Dinwoodie *et al.*, 2012a; Raubex Construction (Pty) Ltd, 2017; Republic of South Africa, 2018; Wooldridge & Stojanovic, 2004). The in-water removal of biofouling from vessel hulls in the dry docks is one of the activities identified to have environmental risk in the port. Toxic contaminants from antifouling coatings may have a negative impact on water quality, sediment and biota (Srinivasan & Swain, 2007; Howell & Behrends, 2010; Dafforn *et al.*, 2011; CSIR, 2016b; Muller-Karanassos *et al.*, 2021). One way to mitigate this pollution problem is to provide awareness and training programmes (Maan *et al.*, 2020, Wrange *et al.*, 2020).

As shown in headings 3.2.4.2, 3.2.5.2, 3.2.6.2, 3.2.7.2, 4.2.1.2, 4.2.2.2, 4.2.3.2, and 4.2.4.2 pollution and water related awareness *as well as* training programmes were found to be the second highest in response percentages from ME's and NME's of all target groups. For this section, on the types of environmental problems, "*pollution*" and "*water*" are also generally rated second to "waste" and "oil spills". It therefore seems like the training and awareness programmes provided on "pollution" and "water" is in line with the environmental risk, as perceived by ME's and NME's, on the same topic.

5.2.10.3 Air pollution

The contractor ME's and NME's gave the lowest response percentages for "air pollution" in terms of the statement: "type of environmental problems that may be caused by your section in the company" (13.0% and 16.3% respectively) (Figure 5.2.10). The tenant ME's and NME's gave 11.8% and 15.8% respectively) for "air pollution" (Figure 5.2.10). The Transnet ME's and NME's gave 15.1% and 16.9% respectively for "air pollution", while WLPs ME's and NME's gave 9.7% and 13.9% respectively) for "air pollution" (Figure 5.2.10).

Air pollution, as referred to in this study, does not necessarily equate to excessive air pollution that may be continuous. Air pollution in this case may be small scale and in limited areas, as indicated in heading 3.2.4 (The Contractors responses (ME's and

NME') concerning environmental awareness programmes). The ME's and NME's response percentages were relatively similar to each other. Both ME's and NME's gave "air" the lowest ranking in terms of types of environmental problems in their sections in the company. All the operational activities of the contractors are identified and listed in relation to their negative impact to the environment. Then mitigation measures are put in place to control negative impact as far as the environment is concerned (in this case air pollution measures). In these processes the employees are empowered with knowledge (Republic of South Africa, 1965 & 1998; Republic of South Africa, 2004; Raubex Construction (Pty) Ltd, 2017).

In the Port of Cape Town, operational activities such as welding, grinding and gas cutting does takes place and may cause air pollution during maintenance of vessels in the dry docks. The mitigation for these activities was awareness and training on standard operating procedures (TNPA, 2015c, g, f; Affsaf Health and Safety Consulting Services CC, 2017; TNPA, 2018c; Transnet SOC Ltd, 2020). To conduct fire related operational activities (such as welding, grinding and gas cutting) in the port requires a hot work permit which must be obtained at the fire services of TNPA (Republic of South Africa, 2005). These types of operations which has the potential to cause "air pollution" is monitored by the port fire officers after obtaining the permit (Republic of South Africa, 2005; Appendix D13).

Operational port activities that can lead to air pollution have been studied due to the significant impact it can have in the environment (Berechman & Tseng 2012). Studies were conducted in order to find ways that will help to reduce the emissions from port production (Roh *et al.*, 2016; Budiyanto *et al.*, 2017; Budiyanto *et al.*, 2019a, b, c). In the port there are several activities that have the potential to affect the environment negatively. The more port operational activities increase, the more likely an emission will increase, especially where mitigations are not considered or actioned accordingly (Zhang *et al.*, 2017).

Majority of the researcher agree that the lesser the activities and increase in air quality the reduced air pollution (Dutheil *et al.* 2020; Muhammad *et al.* 2020; Stratoulis & Nuthammachot, 2020).

As stipulated in headings 3.2.4.3, 3.2.5.3, 3.2.6.3, 3.2.7.3, 4.2.1.3, 4.2.2.3, 4.2.3.3 and 4.2.4.3 “air pollution related awareness and training” was found to be the lowest in response percentage for contractors, tenants, Transnet and WLPs in comparison to the other options of the rest of the responses for both related awareness and training for ME’s and NME’s. These response percentages had a similar pattern to responses on the statement:” Type of environmental problems that may be caused by your section in the company”. It could be possible that the training and awareness programme as far as “air pollution” is concerned to both ME’s and NME’s were offered as a possible way of intervention.

ATTITUDE

ABSTRACT

There are many global environmental problems. Environmental pollution continues to become a growing problem, while the resource needs of a growing human population also increase. Part of the challenges are the way in which the human population live and behave in terms of the environment. Just like many other disciplines trying to provide solutions to many challenges faced, psychology is attempting ways also that will encourage the human race to be responsible in using the remaining environmental resources of the planet sensibly without unnecessary exploitation. The attitude of the public becomes very crucial to understand how policies should be designed that will be used to address environmental challenges. Studying the attitude of the public regarding particular matters becomes an important tool. Self-administered questionnaires were used on the managerial employees (ME's) and the non-managerial employees (NME's) of the four target groups. Data was collected from the government department officials by means of structured interviews. The collected data was tabulated and coded. An explorative descriptive study and statistical analysis was done using SPSS 25 software and Microsoft Office Excel. The study findings revealed common understanding of the ME's and NME's attitude that waste and pollution is everyone's problem in the port environment. The identified environmental issues are addressed. There are environmental legislations workshops offered by the government to interested organisations. Most of the port users were found to have a positive environmental attitude.

6.1 INTRODUCTION

Environmental pollution continues to become a growing problem, while the resource needs of a growing human population also increase. Part of the challenges are the way in which the human population live and behave in terms of the environment. Just like many other disciplines trying to provide solutions to many challenges faced, psychology is attempting ways that will encourage the human race to be responsible in using the remaining environmental resources of the planet sensibly without unnecessary exploitation (Stern, 1992). Xu *et al.* (2017) argued that attitude of the public becomes very crucial to understand how policies should be designed that will be used to address environmental challenges. Studying the attitude of the public regarding particular matters becomes an important tool. There have been many techniques used in the past to study the attitudes of people regarding a particular matter. Attitude has been considered as a decision someone stand for on something, for instance, a mental or physical predisposition, a tendency, or a relatively stable assessment answer. In other words, attitude could be defined “as a position to express a state of mind, an intention, or a way of seeing the world” (Katz *et al.*, 1959). There are other researchers that defined attitude according to their understanding. Eagly and Chaiken (1993) define attitude as “a psychological tendency that is expressed by evaluating a particular entity with some degree of favour or disfavour”.

From an environmental point of view, Gallagher (2004) defines attitude as “perceptions of, or beliefs regarding the physical environment, including factors affecting its quality” (e.g. over population, pollution). Many researchers have investigated environmental attitude. Heberlein (1981) states that “any object outside of self exists in the individual’s environment, so all attitudes except those beliefs about self could be correctly called environmental attitudes”. Milfont (2012) argued that the term “environment” could as well denote to both built and non-human environments. Therefore, environmental attitudes may possibly refer to attitudes concerning all external objects of one’s reality. Bohner *et al.* (2014) states that an attitude object can be considered as whatever thing a person holds in the mind or discriminates. Dunlap and Michelson (2002) preferred the term environmental concerns instead of environmental attitude. They define environmental concern as “the degree to which people are aware of problems regarding the environment and support efforts to solve

them and/or indicate a willingness to contribute personally to their solution” (Dunlap & Michelson 2002).

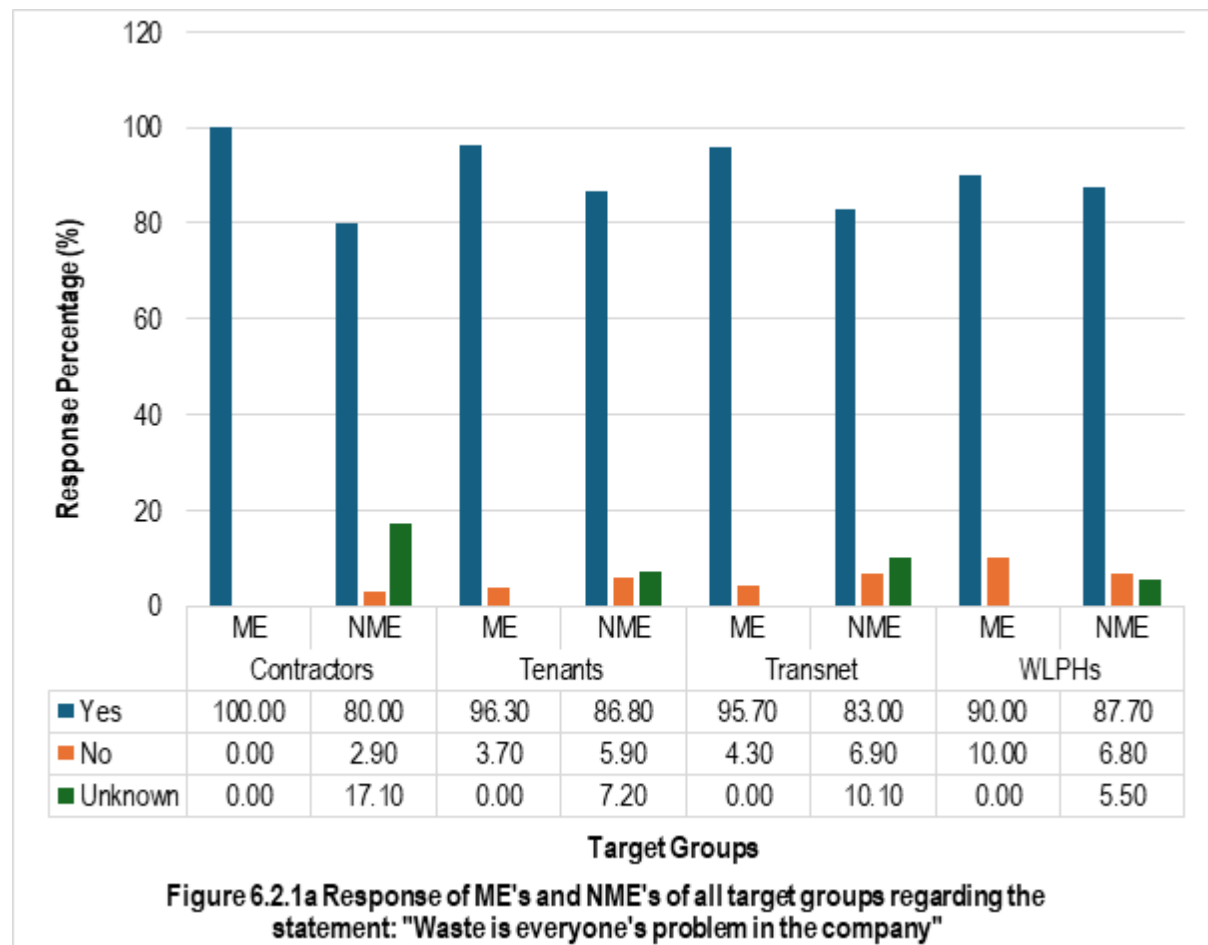
Bohner *et al.* (2002) argued that attitude gives a structure for putting in place a systematic arrangement and handling of a challenging environment that is ambiguous. Milfont (2007) deduced three main purposes of functional attitudes in the following manner. Firstly, attitudes “help us to understand the world”; secondly “help us to express our basic values, and lastly attitude “help us to enhance and maintain our self-esteem”. Furthermore, Milfont (2007) approached environmental attitude functions in main three determinations: - (i) “to help us to understand the world by simplifying knowledge about objects in the environment”; (ii) to help us to establish our self-identity and express our values”; and (iii) “help us to defend the self from conflicting mind or wishes.

The research objectives as it relates to this chapter are: To ascertain the level of environmental attitude of the Port of Cape Town users, especially in waste and pollution matters. Also, to engage relevant local government departments to understand the role they are playing in support of a positive environmental attitude at the Port of Cape Town.

6.2 RESULTS AND DISCUSSION

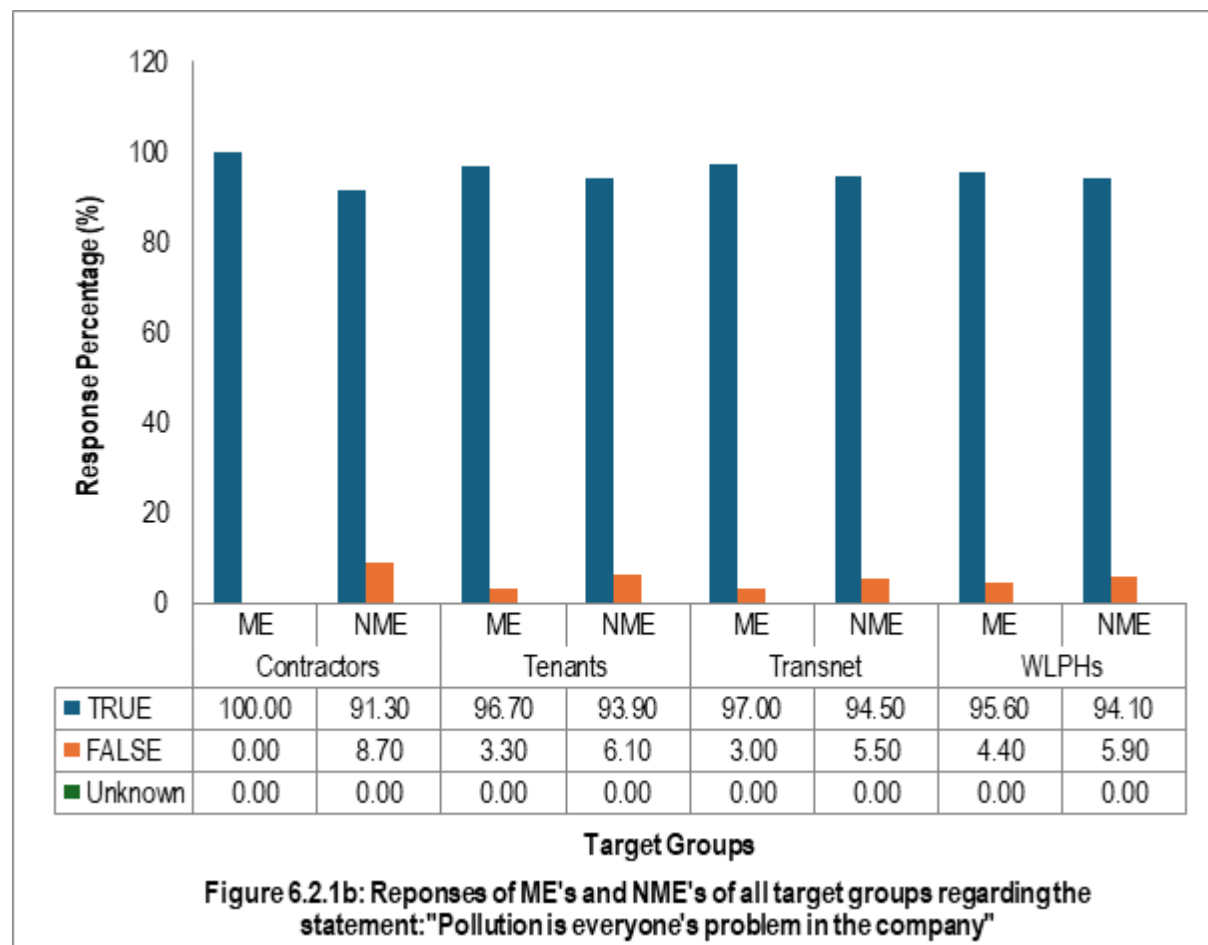
When reference is made to Transnet in the results it refers to the Transnet National Ports Authority (TNPA). The contractors, tenants, Transnet and waste licence permit holders (WLPH's) were the target group of this study, as well as specific government department officials, as detailed in chapter 2. Self-administered questionnaires were used on the managerial employees (ME's) and the non-managerial employees (NME's) of the four target groups. Data was collected from the government department officials by means of structured interviews. The collected data was tabulated and coded (Appendix A10.1&2). An explorative descriptive study and statistical analysis was done using SPSS 25 software and Microsoft Office Excel (Shil *et al.*, 2013; Appendix A12.1&2). The data mainly consists of non-parametric ordinal and nominal data. Chi square analysis was used to search for statistical significant influences of independent variables on dependent variables.

6.2.1a Responses of ME's and NME's of all target groups regarding the statement: "Waste is everyone's problem in the company"



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement posed to them: "Waste is everyone's problem in the company" ($P > 0.05$) (Figure 6.2.1a).

6.2.1b Responses of ME's and NME's of all target groups regarding the statement: "Pollution is everyone's problem in the company"



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement posed to them: "Pollution is everyone's problem in the company" ($P > 0.05$) (Figure 6.2.1b).

The uncertainty of the "unknown" response may be interpreted as a negative response and can be considered to be closer to a "no" response than a "yes" response, or even an indication of ignorance.

6.2.1.1 Contractors

The ME's and NME's overwhelmingly chose the option of "yes" (100 and 80%, respectively) for the statement: "Waste is everyone's problem in the company". Only a few of NME's (17.1%) chose the option of "unknown" (Figure 6.2.1a).

The ME's and NME's overwhelmingly chose the option of "true" (100 and 91.3 %, respectively) for the statement: "Pollution is everyone's problem in the company". Only a few of the NME's (8.7 %) chose the option of "false" (Figure 6.2.1b).

Waste and pollution are everyone's problem in the company as far as contractor ME's and NME's were concerned. For many years waste and pollution has been a global problem that requires a collective approach (Starovoytova, 2018; Denton, 1999; Tsiboe & Marbell, 2004). Denton (1999) argued that it is everyone's ownership to accept the responsibility of pollution in their company. According to Section 28 (Duty of Care) of the National Environmental Management Act (NEMA) (Act 107 of 1998), everyone who handles waste and pollution is ethically responsible to ensure that care is applied. Whoever may cause any significant waste and pollution or degradation to the environment must apply necessary control measures to avoid repeat offences and rectify actions that may degrade the environment (Republic of South Africa, 1998a). In heading 5.2.7.1, dealing with the statement, "I am informed of the environmental legislation", the majority of ME's and NME's can be deemed as being knowledgeable on environmental legislation. It could then be possible that the knowledge of waste and pollution in terms of legislation influenced the ME's and NME's acceptance of responsibility. Their attitude reflected in their response percentages that were overwhelmingly in favour of the "yes" and "true" responses, and in the process acknowledging that waste and pollution is everyone's responsibility in their company.

Furthermore, as indicated in heading 4.2.1.1 on "waste and oil spill related training", the contractors provide training on waste matters to ensure that the employees take responsibility regarding waste in their work environment. Additionally, Transnet SOC Ltd (2017a) contract procedures require contractors to compile and submit a Safety Health, Environment Plan (SHEP) file. Within this file, environmental policies should be included stipulating the commitment of the management to ensure that its employees and the organisation will play a role to influence the public and those that they do business with to prevent any damage to the environment and also to draft an environmental management plan that will clearly inform the management of waste and pollution. According to Raubex Construction Pty (Ltd) (2017), during their concrete repair and sealing work of the dock walls at of the dry docks in the Port of Cape Town, the SHEP file indicated that all the employees were responsible for the waste and

pollution generated during their operation. There was a house-keeping inspection register, where issues such as waste and pollution can be recorded (Appendix E1). Therefore, it could be possible that environmental legislation, Transnet's contractor procedures, contractor's policies, SHEP files, environmental management plans and housekeeping inspection registers, all contributed to the high levels of "yes" and "true" response percentages for regarding whose problem waste and pollution is in the company. It can be concluded that there is positive attitude among the ME's and NME's in understanding that waste and pollution is everyone's problem in the company.

6.2.1.2 Tenants

The ME's and NME's overwhelmingly chose the option of "yes" (96.3 and 86.8%, respectively) for the statement: "Waste is everyone's problem in the company" . Only a few of the NME's chose the option of "unknown" (7.2%) (Figure 6.2.1a).

The ME's and NME's mostly chose the option of "true" (96.7% and 93.9%, respectively) for the statement: "Pollution is everyone's problem in the company" . A few of the ME's (3.3%) and NME's (6.1%) chose the option of "false" (Figure 6.2.1b).

According to the tenant ME's and NME's waste and pollution is everyone's problem in the company. Columbus (2006) argued that many societies and industries struggle to achieve proper waste and pollution management by not enforcing individual responsibility. Atash (2007) indicates that due to the increasing population most cities are encountering waste and pollution problems. In order to combat these challenges, public participation from the community, industries and academia is very critical. Furthermore, in terms of Section 62 of the National Ports Act (No. 12 of 2005), the duties that the tenants must comply with, among others, is to be compliant to environmental laws and regulations (Republic of South Africa, 2005). It is possible that the knowledge that ME's and NME's have in environmental laws and regulation, as far as waste and pollution is concerned, has contributed factors in keeping the tenants accountable and its employees responsible for waste and pollution in their company operational activities. Therefore, the response percentages of ME's and NME's, where the "yes" and "true" options were mostly chosen, may be regarded as a sign of a positive attitude in relation to taking responsibility in terms of waste and pollution.

In terms of Section 16 of the National Environmental Management: Waste Act of 2008 (No. 59 of 2008) ("NEM: WA") the "General Duty" in respect of waste management, states that the holder of waste must take all reasonable measures to avoid the generation of waste, and in instances where waste cannot be avoided, at least to minimise the toxicity and the amount of such waste. Also, to manage waste in such a way that will protect the environment from any harm and the health of the people (Republic of South Africa, 2008). Furthermore, in terms of Section 62 of the National Ports Act (No. 12 of 2005), the duties that the tenants must comply with, among others, is to be compliant to environmental laws and regulations (Republic of South Africa, 2005). It is possible that Section 28 of NEMA (Act 107 of 1998), Section 21 of the NEM: Waste Act (No. 59 of 2008) and Section 62 of the National Ports Act (No. 12 of 2005) were contributing factors in keeping the tenants accountable and their employees responsible for waste in their companies. The response percentages of ME's and NME's may be regarded as a sign of positive attitudes regarding matters of waste and pollution.

6.2.1.3 Transnet

The ME's and NME's mostly chose the option of "yes" (95.7% and 83.0%, respectively) for the statement: "Waste is everyone's problem in the company". Much less of the ME's (4.3%) and NME's (6.9%) chose the option of "no". Some NME's chose the option of "unknown" (10.1%) (Figure 6.2.1a).

The ME's and NME's overwhelmingly chose the option of "true" (97.0 and 94.5%, respectively) for the statement: "Pollution is everyone's problem in the company". Much less of the ME's (3.0%) and NME's (5.5%) chose the option of "false" (Figure 6.2.1b).

According to most of the ME's and NME's of Transnet Waste and pollution was seen as everyone's problem in the company. Starovoytova (2018) states that the way every individual, company, community or country manages their waste has a great potential to determine the future of such entities in relation to waste. Reed (2002) argued that the involvement of all the employees in the industries will play an important role to improve pollution related problems. As indicated in heading 4.2.6.3 Transnet has environmental policies and procedures in place for waste and pollution. The SHEQ policy of Transnet, signed by the CEO, commits that all the employees of the

organisation will adhere to all the environmental legislation and regulations (Transnet SOC Ltd, 2020). The Port of Cape Town has an approved Integrated Waste Management Plan (IWMP) (TNPA, 2015a & 2020a). The plan indicates the way Transnet employees should manage waste and pollution. According to the approved EMP for TNPA, a hazardous waste material management programme (HWMMP) should be developed. This programme should establish the necessary protocol for the proper handling and removal of hazardous waste materials on the work site. The information on each hazardous substance should be available to all persons on site in the form of Material Safety Data Sheets (MSDS) (TCP, 2018). It is possible that the legislation, environmental policy, IWMP and EMP's mentioned above influenced the response percentages from ME's and NME's. These response percentages may therefore be an indication of a positive attitude of ME's and NME's of Transnet in terms of the responsibility of individuals for waste and pollution related issues in the company.

6.2.1.4 Waste Licence Permit Holders

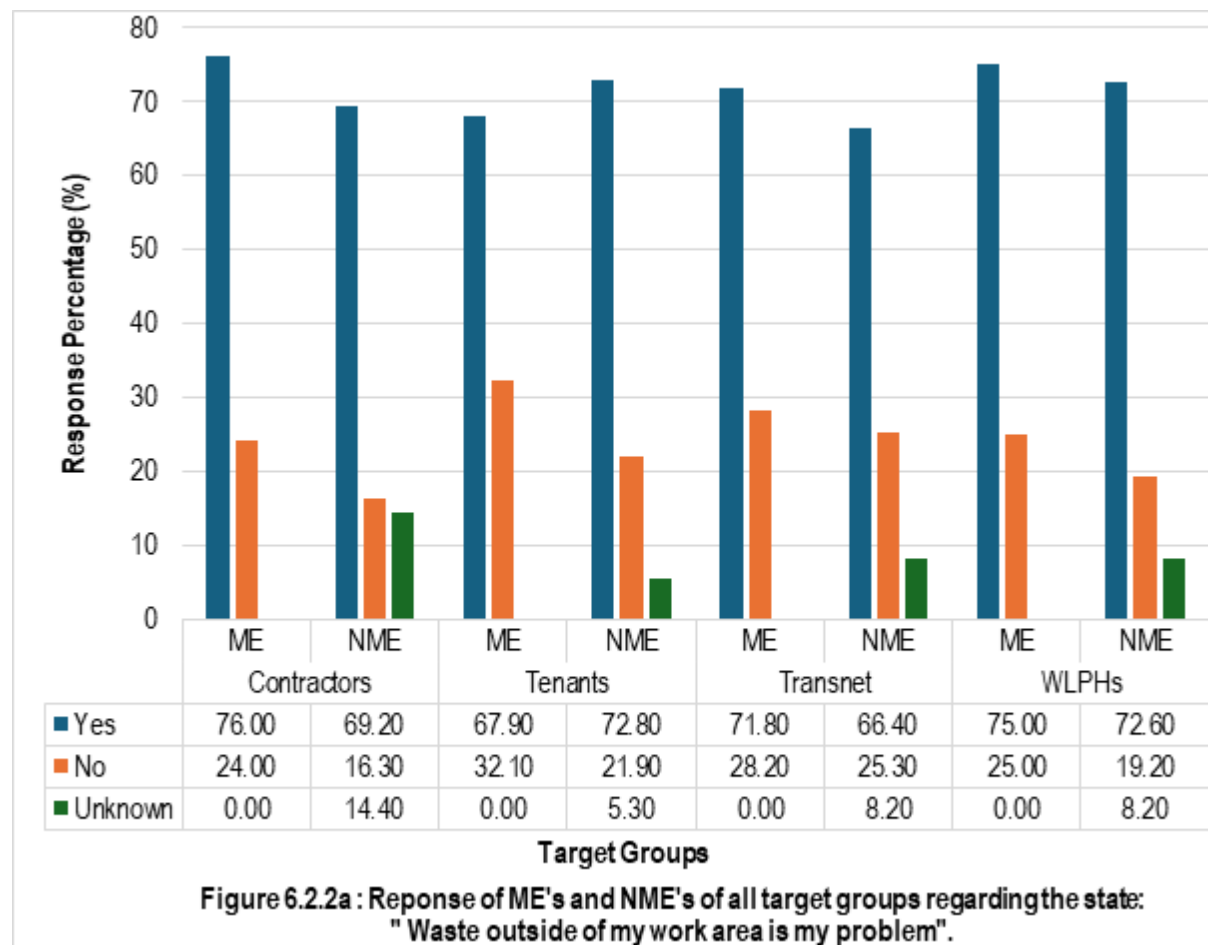
The ME's and NME's overwhelmingly chose the option of "yes" (90.0 and 87.7%, respectively) for the statement: "Waste is everyone's problem in the company". Much less of the ME's (10.0%) and NME's (6.8%) chose the option of "no" (Figure 6.2.1a).

The ME's and NME's overwhelmingly chose the option of "true" (95.6 and 94.1%, respectively) for the statement: "Pollution is everyone's problem in the company". Much less of the ME's (4.4%) and NME's (5.9%) chose the option of "false" (Figure 6.2.1b).

According to most of the ME's and NME's of the WLPH's waste and pollution is seen as everyone's problem in the company. Hasan (2011) and Brugge (2018) argue that waste and pollution is a challenge to everyday life. As a result of this challenge the management of waste and pollution is a widespread problem to everyone and to solve this challenge it requires collaboration and related knowledge on waste and pollution. As indicated in heading 4.2.4.1 waste is the core business of the WLPH's. It is required of the WLPH's to ensure that their employees are familiar with waste issues in relation to Sections 16 and 21 of the Waste Act (No. 59 of 2008) and other related regulations (Republic of South Africa, 2005; Republic South Africa, 2008; City of Cape

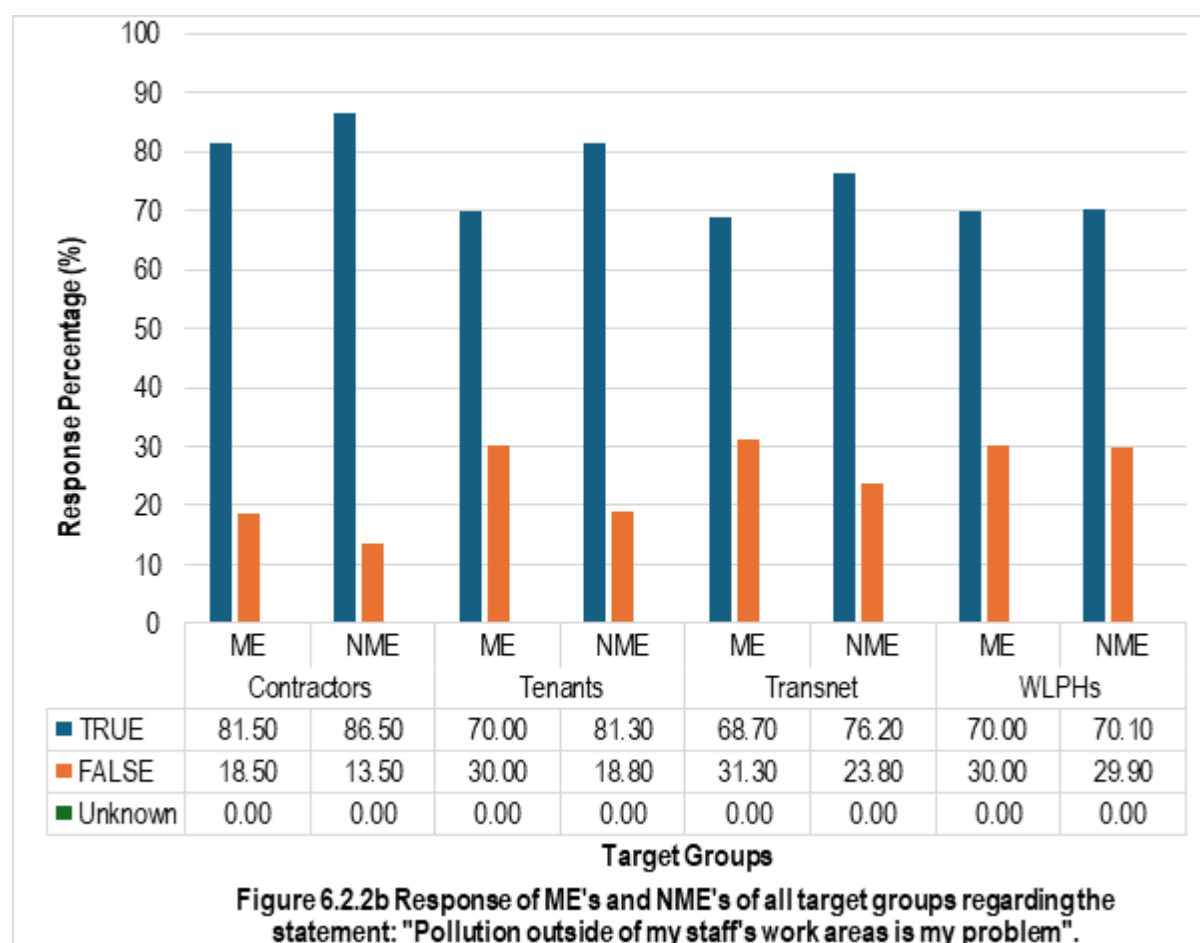
Town, 2010b). Furthermore, as indicated in heading 4.2.4.2 SHE policies of the WLPH's show that management of these companies made a commitment to ensure that the employees at the workplace are safe and there are reasonable measures to ensure that pollution is prevented during operational activities (DCD Marine Cape Town (Pty) Ltd, 2015b). It is thus possible that the knowledge in environmental legislation and company policies influenced the ME's and NME's in their responses. These may be contributing factors to the high positive response rate, which in turn is an indication of a positive attitude in terms of individual responsibility in relation to waste and pollution in these companies.

6.2.2a Responses of ME's and NME's of all target groups regarding the statement: "Waste outside of my work area is my problem."



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement: "Waste outside of my work area is my problem" ($P > 0.05$) (Figure 6.2.2a).

6.2.2b Responses of ME's and NME's of all target groups regarding the statement: "Pollution outside of my work area is my problem."



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement: "Pollution outside of my work area is my problem" ($P > 0.05$) (Figure 6.2.2b).

The uncertainty of the "unknown" response may be interpreted as a negative response and can be considered to be closer to a "no" response than a "yes" response, or even an indication of ignorance.

6.2.2.1 Contractors

The ME's and NME's overwhelmingly chose the option of "yes" (76.0 and 69.2%, respectively) for the statement: "Waste outside of my work area is my problem". Much less of the ME's (24.0%) and NME's (16.1%) chose the option of "no" (Figure 6.2.2a).

The ME's and NME's overwhelmingly chose the option of "true" (81.5 and 86.5%, respectively) for the statement: "Pollution outside of my work area is my problem". Much less of the ME's (18.5%) and NME's (13.5%) chose the option of "false" (Figure 6.2.2b).

ME's and NME's mostly indicated that waste and pollution outside of their work area is part of their responsibility. ME's and NME's therefore took ownership with regard to waste and pollution issues, even outside of their work areas. Section 24 of the Constitution of South Africa (Act no. 108 of 1996) stipulates that "Everyone has the right – (a) to an environment that is not harmful to their health or wellbeing; and (b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that- (i) prevent pollution and ecological degradation; (ii) promote conservation; and (iii) secure ecological sustainability development and the use of natural resources while promoting justifiable economic and social development" (Republic of South Africa, 1996a). Reddy (2007) argued that proper care of waste plays an important role for any environmental strategy. Reddy further indicates that any waste that accumulates in residential, business, urban or rural settings is an environmental threat and is hazardous to human health.

Heading 5.2.8.1 revealed that both ME's and NME's were informed of relevant environmental legislation. Furthermore, headings 3.2.4.1 and 4.2.1.1 (waste and oil spill), as well as headings 3.2.4.2 and 4.2.1.2 (pollution and water) indicated that awareness and training programmes were offered to ME's and NME's as far as waste and pollution were concerned. Additionally, headings 3.2.1.2 and 3.2.2.2 that deal with the NME's responses in relation to the question: "Think about waste and pollution. What comes to mind?", revealed that port clean ups dealt with waste and pollution in the vicinity of the port, where MEs and NME's were involved in ensuring that the port environment is kept clean. It is therefore possible that all the training, awareness and participation in the port and port clean up initiatives contributed to the positive attitude of the ME's and NME's with regards to who is responsible for waste and pollution even outside of their work areas.

6.2.2.2 Tenants

The ME's and NME's mostly chose the option of "yes" (67.9% and 72.8%, respectively) for the statement: "Waste outside of my work area is my problem" . Much less of the ME's (32.1 %) and NME's (21.9%) chose the option of "no" (Figure 6.2.2a).

The ME's and NME's mostly chose the option of "true" (70.0 % and 81.3%, respectively) for the statement: "Pollution outside of my work area is my problem" . Much less of the ME's (30.0 %) and NME's (18.8%) chose the option of "false" (Figure 6.2.2b).

From the response percentages it can be deduced that the vast majority of the tenant ME's and NME's viewed waste and pollution outside of their work area as their problem. Section 24 of the South African Constitution (Act no. 108 of 1998) promotes an environment free from waste pollution (Republic of South Africa, 1996a). Zube (1991) argued that people can only relate to environmental concerns if it is concrete and is experienced close to them. Heading 5.2.7.2 revealed that ME's and NME's are informed of environmental legislation. Furthermore, headings 3.2.4.1 and 4.2.2.1 on "waste" and "oil spill", as well as headings 3.2.4.2 and 4.2.2.2 on "pollution" and "water" indicated that awareness and training programmes were offered to ME's and NME's on issues of waste and pollution.

Additionally, headings 3.2.1.3 and 3.2.2.2 on the question: "Think about waste and pollution. What comes to mind?" revealed that port clean ups were practical initiatives that were dealing with the problem of waste and pollution in the port environment. There is a high possibility that awareness and training programmes and the involvement of ME's and NME's in port clean-ups played a critical role in influencing attitudes of the employees. All these reflect a positive attitude in relation to waste and pollution.

6.2.2.3 Transnet

The ME's and NME's mostly chose the option of "yes" (71.8 and 66.4%, respectively) for the statement: "Waste outside of my work area is my problem" . Much less of the ME's (28.2%) and NME's (25.3%) chose the option of "no" (Figure 6.2.2a).

The ME's and NME's mostly chose the option of "true" (68.7 and 76.2%, respectively) for the statement: "Pollution outside of my work area is my problem". Much less of the ME's (31.3%) and NME's (23.8%) chose the option of "false" (Figure 6.2.2b).

Most of the Transnet ME's and NME's indicated that waste and pollution outside of their work areas are their problems. The South African ports are faced with several environmental challenges as far as waste and pollution is concerned (EMD, 2014). The Port of Cape Town is not excluded from these challenges. The port constantly receives waste and pollution arising from the city via the Salt River and a few storm water outlets. Transnet has been cleaning litter and other waste that comes from the Salt River, the storm water outlets, and the surrounding environment (Appendix E2). The ME's and NME's of Transnet, especially the pollution team clean waste and pollution originating from outside the port environment and disposed of it. Port clean-ups are part of the initiatives attempting to solve some of the waste and pollution challenges in the port. Transnet ends up paying the costs of the management of waste and pollution problems in the port environment, although some of these problems originate from outside the port premises. As discussed in heading 3.2.1.2 (*The NME's responses in relation to the question: Think about waste. What comes to mind?*) the participants during Port clean-ups more often are rewarded with "goodies" as a token of appreciation which has financial contribution. Apart from these costs, Transnet also funds the monitoring of water and air pollution studies. Failure of Transnet to deal with waste and pollution could easily create more challenges for the port environment. Possibly the ME's and NME's response percentages were influenced by these activities where the port is intensively involved. The response percentages may be a reflection of a positive attitude in terms of waste and pollution outside the employees work areas.

6.2.2.4 Waste Licence Permit Holders

The ME's and NME's mostly chose the option of "yes" (75.0 and 72.6%, respectively) for the statement: "Waste outside of my work area is my problem". Much less of the ME's (25.0%) and NME's (19.2%) chose the option of "no" (Figure 6.2.2a).

The ME's and NME's mostly chose the option of "true" (70.0 and 70.1%, respectively) for the statement: "Pollution outside of my work area is my problem". Much less of the ME's (30.0%) and NME's (29.9%) chose the option of "false" (Figure 6.2.2b).

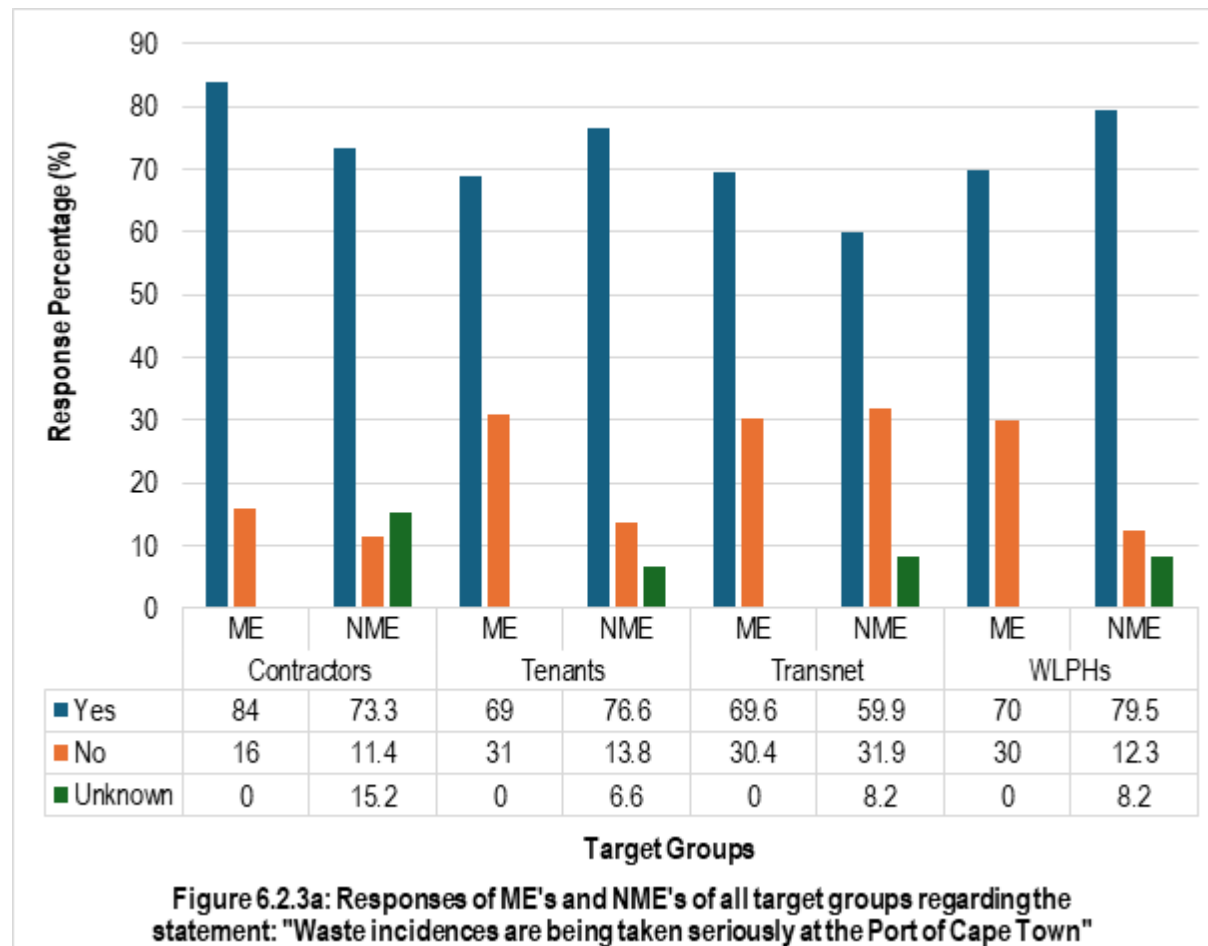
Generally, ME's and NME's regard waste and pollution outside of their work areas as an issue that is their problem. In terms of the purpose and functions of WLPH's, waste is an important source of revenue due to the type of services they render. Smith (1993) argued that waste is a resource that differs from other resources in two major ways: "(1) its resource base has been steadily increasing, and (2) the goal of waste management is to reduce rather than to increase or sustain the resource base." In the context of WLPH's waste is a resource to be managed to the benefit of the environment and the benefit of the company's business and financial goals.

The South African Constitution (Act no. 108 of 1996) indicates that everyone has a right to an environment that is free from waste and pollution. The environment should be protected even for the benefit of future generations (Republic of South Africa, 1996a). Heading 5.2.7.4 shows that WLPH's (ME's and NME's) are informed of the environmental legislation. Furthermore, headings 3.2.7.1 and 4.2.4.1 on "waste and oil spill" and headings 3.2.7.2 and 4.2.4.2 on "pollution and water" reveal that awareness and training programmes were offered to ME's and NME's as it relates to waste and pollution. It is possible that awareness and training programmes clarified the opportunities of waste and pollution to ME's and NME's. It is thus possible that knowledge of legislation, as well as the provision of awareness and training programme influenced the positive attitude that is seen reflected in response percentages of the ME's and NME's. Seeing waste and pollution as a problem it is seen as an opportunity, especially in this sector of service. They view waste and pollution as an opportunity. WLPH's remove waste and pollution for the clients, which is revenue for them (Appendix E9).

For all the target groups (contractors, tenants, Transnet and WLPHs), there were few of the ME's and NME's indicated "no" for waste and pollution outside of their staff working environment as their problem. These may be the group that may not have been provided with awareness, training, environmental legislation, and neither participated in the port clean ups and littering programmes like the earlier group who

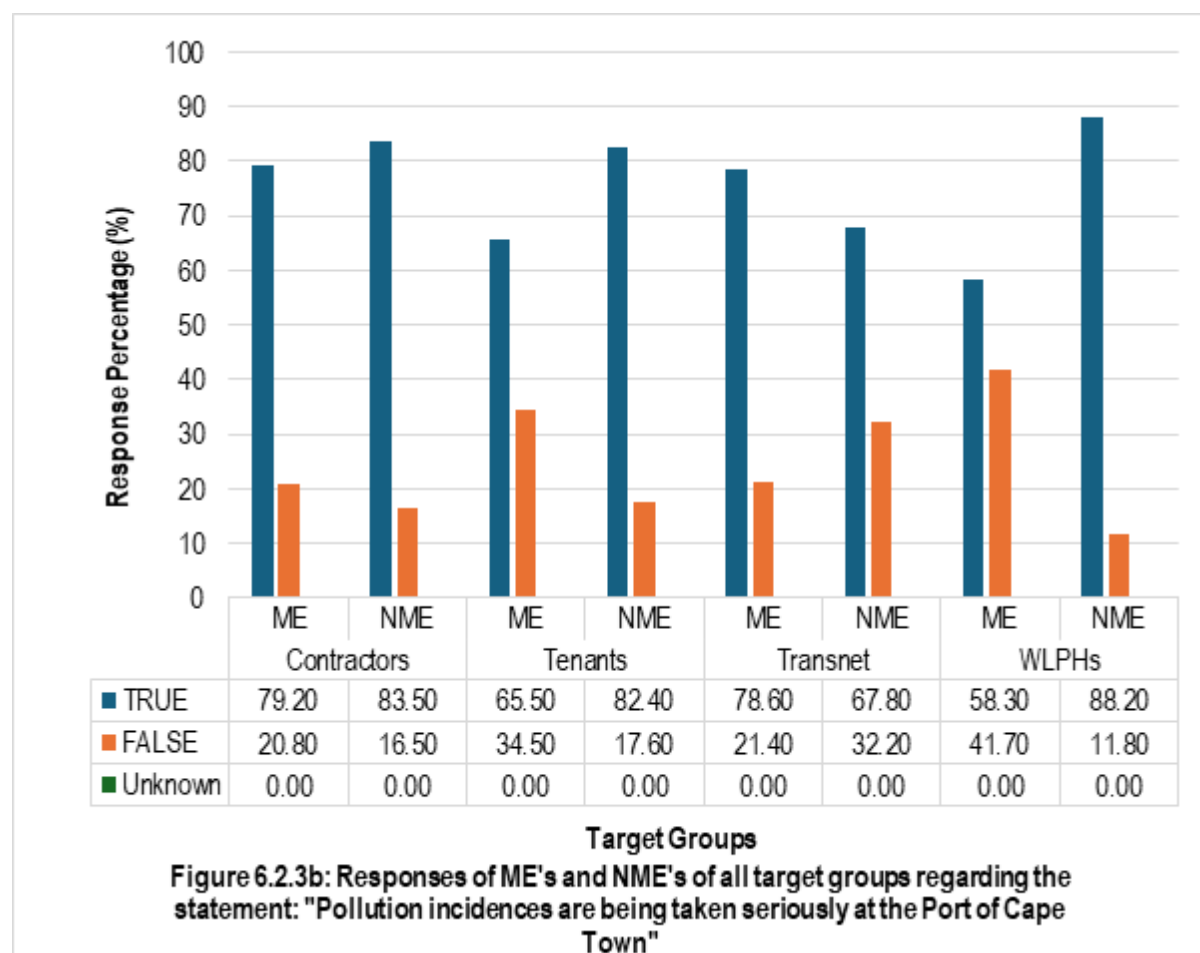
has an exposure. It should be noted that there were occasions due to financial moratorium without “goodies” being provided to the participants where else Port clean-up must continue. The participants were used to receive “goodies” on these port clean-ups programme that might have created expectations. This may have contributed to a negative attitude caused by all the port clean-up operations that has to be done without any reward and the influx of waste from the city into the port environment.

6.2.3a Responses of ME's and NME's of all target groups regarding the statement: "Waste incidences are being taken seriously at the Port of Cape Town"



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement: "Waste incidences are being taken seriously at the Port of Cape Town" ($P > 0.05$) (Figure 6.2.3a).

6.2.3b Responses of ME's and NME's of all target groups regarding the statement: "Pollution incidences are being taken seriously at the Port of Cape Town"



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the statement: "Pollution incidences are being taken seriously at the Port of Cape Town" ($P > 0.05$) (Figure 6.2.3b).

The uncertainty of the "unknown" response may be interpreted as a negative response and can be considered to be closer to a "no" response than a "yes" response. It can even be seen as an indication of ignorance on the side of the respondents.

6.2.3.1 Contractors

The ME's and NME's overwhelmingly chose the option of "yes" (84.0 and 73.3%, respectively) for the statement: "Waste incidences are being taken seriously at the Port of Cape Town". Much less of the ME's (16.0%) and NME's (11.4%) chose the option of "no". No ME's chose "unknown", while only 15.2% of the NME's chose this option (Figure 6.2.3a).

The ME's and NME's overwhelmingly chose the option of "true" (79.2 and 83.5%, respectively) for the statement: "Pollution incidences are being taken seriously at the Port of Cape Town". Much less of the ME's (20.8%) and NME's (16.5%) chose the option of "false". No ME's and NME's chose "unknown" (Figure 6.2.3b).

From the response percentages it can be deduced that most contractor employees take waste and pollution incidences seriously at the Port of Cape Town. Section 56 of the National Ports Act (no.12 of 2005) states: "The Authority may enter into an agreement with any person in terms of which that person, for the period and in accordance with the terms and conditions of the agreement, is authorised to ... *[Among others]* operate a port facility or provide services relating thereto". Contractors operate in the dry docks and must in adherence to their contracts with the TNPA ensure that waste and pollution related matters are attended to. The TNPA has a right to suspend the service contracts of contractors for a certain period that is reasonable, especially where waste and pollution related incidences that have negative impacts on the environment was not addressed as it was supposed to (Republic of South Africa, 2005).

The contractors are also expected to submit an incident / accident management plan to be included in the SHEP file. There are procedures in place for incident / accident management for contractors working in the port. The procedures indicate that all incidents involving waste and pollution and any related matter be reported before the end of every shift. The requirements for notification to the TNPA are: Telephonic reporting to the Transnet Project Manager immediately and a flash report within 24 hours. The investigation must commence within 7 days of the incident (TNPA, 2015f). Any incident that requires reporting to the relevant local authorities must also be done at least within 14 days of occurrence as stated in section 30 of NEMA (Act no. 107 of

1998). The root cause must also be determined (Raubex Construction Pty Ltd, 2017; Republic of South Africa, 1998a). It is possible for these control measures that are in place between the TNPA, and the contractors contributed to the high response percentages for the “yes” and “true” options from the contractors (ME’s and NME’s). There are a clear expectation and procedure for the contractors to follow in the case of waste and pollution incidences. Therefore, waste and pollution incidences seem to be taken seriously at the port, from the perspective of most contractor employees.

6.2.3.2 Tenants

The ME’s and NME’s mostly chose the option of “yes” (69.0 and 76.6%, respectively) for the statement: “Waste incidences are being taken seriously at the Port of Cape Town”. Fewer of the ME’s (31.0%) and NME’s (13.8%) chose the option of “no” (Figure 6.2.3a).

The ME’s and NME’s mostly chose the option of “true” (65.5% and 82.4%, respectively) for the statement: “Pollution incidences are being taken seriously at the Port of Cape Town”. Fewer of the ME’s (34.5%) and NME’s (17.6%) chose the option of “false” (Figure 6.2.3b).

From the response percentages it seems like waste and pollution incidences are being taken seriously at the Port of Cape Town, from the viewpoint of most the tenants. In heading 4.2.2.1 on “waste and oil spill” as well as heading 4.2.2.2 on “pollution” environmental training programmes were offered to ME’s and NME’s of the tenants. In terms of Section 62 of the National Ports Act (no. 12 of 2005) it is required of the port users to comply with all environmental laws and regulations. The tenants, as port users, are obliged to inform the TNPA and the relevant local authorities within 24 hours of any incidence caused by their operations that had a negative impact on the environment. Failure to do so, may result in the TNPA suspending that tenant’s operations for a reasonable period (Republic of South Africa, 2005). All incidents or near misses must be reported. An investigation report must be made available for review to the management of the affected tenant. The tenant subcontractors must investigate their own incidents and provide a report to the appropriate tenant and also reporting to the relevant authorities within the described period as per legislation (Republic of South Africa, 1998a; DCD Marine (Pty) Ltd, 2015a). Subcontractors must

submit their first “flash report” within the same shift and the final report within three days. Any witnesses must remain present and available unless he/she is permitted to leave instructed by the Incident Coordinator. No evidence should be removed unless it poses further danger until permission has been granted by the SHEQ Coordinator or Project Manager. All documents related to the incident investigation must be forwarded to the SHEQ Coordinator for submission to the relevant local authorities and for record keeping purposes. Furthermore, the Project Manager and SHEQ Coordinator must ensure that a full analysis of all incidents is appropriately reported to the TNPA and Local Authority (Republic of South Africa, 1998a; DCD Marine Cape Town (Pty) Ltd, 2015a; TNPA, 2015b&d). It is possible that environmental training programmes, knowledge of environmental legislation and the incident procedures (described above) contributed to the high positive response percentages received from ME’s and NME’s. All the above contributed to a positive attitude from most of the employees with regards to waste and pollution incidents and the management thereof.

As previously indicated fewer of the ME’s (34.5%) and NME’s (17.6%) chose the option of “false” (Figure 6.2.3b). During the ES oversight audit (TNPA, 2015b), the report indicated that there were some tenants which did not have IWMPs for their operations. In the interview of the local government, the official's response was: *“Transnet to review the requirements on tenant management. And the following should be included among other things. They should compile IWMP (Integrated Waste Management Plans). This plan should indicate - “Type of waste, quantities, handling, storage, recycling (waste minimization process conducted) disposal waste and / or rates”*. The response from the local government shows that they feel that there is much that needs to be done especially to tenants in the Port of Cape Town. The views of the local government were aligned with some of the study findings which was related to tenants. For instance, in heading 5.2.8.2 (Tenants) for the statement: “Do you have integrated waste management plans in place” it was found that some tenants did not have IWMP in place which corresponds with the local government interviews responses.

Furthermore, the government official's response of the interviews that relates to tenant lease agreements were: *“Review of lease agreements to incorporate environmental*

compliance requirement, and “Pollution incidents and management to be included in the lease agreement”.

In 2.9.3 heading (Tenants Sampling Procedure) and 4.2.2 (Tenant responses (ME and NME's) concerning environmental training programmes) it was indicated that most tenants already gained access to the port some years ago, and maybe, even without any strict rules with regards to most environmental requirements. Some tenants have 5 to-10 year lease agreements with the TNPA, while others may have more than 20 to 25-year lease agreements (Appendix C7), while the majority of the leases were signed already some years before. The government officials further stated that Transnet should...*“Include the pollution incident management...”*. Due to this it is possible that some tenants may have neglected some environmental requirements that are recently crucial to adhered to. The study findings indicated that future lease agreements of tenants should also be reviewed, and it should be compulsory that tenants comply to environmental related requirements. Additionally, to include the pollution incident management. It is evident that the local government concerns are related to the study findings for negative attitude with a positive attitude.

6.2.3.3 Transnet

The ME's and NME's mostly chose the option of “yes” (69.6 and 59.9%, respectively) for the statement: “Waste incidences are being taken seriously at the Port of Cape Town”. Fewer of the ME's (30.4%) and NME's (31.9%) chose the option of “no” (Figure 6.2.3a).

The ME's and NME's mostly chose the option of “true” (78.6 and 67.8%, respectively) for the statement: “Pollution incidences are being taken seriously at the Port of Cape Town”. Fewer of the ME's (21.4%) and NME's (32.2%) chose the option of “false” (Figure 6.2.3b).

Since most of the Transnet ME's and NME's chose the “yes” and “true” options, it can be deduced that Transnet employees, for the most part, are taking waste and pollution incidences seriously at the Port of Cape Town. Transnet policy requires that everyone within the organisation comply with all the environmental laws and regulations of the country (Transnet SOC Ltd, 2020). Section 30 of NEMA (Act no. 107 of 1998) requires

that all the incidents be reported to the relevant local authorities. Failure to report could result in a penalty in the form of a fine of up to 10 million Rand or imprisonment for up to 10 years (Republic of South Africa, 1998a). Transnet environmental policy indicates that all employees must adhere to all environmental legislation (Transnet SOC Ltd, 2020). Transnet has a dedicated pollution team that attends environmental incidents like oil spills, both on land and water. They also respond to incidences of illegal waste within the Port of Cape Town (Appendix – E4). The high positive response percentages are indicative of a positive attitude. This may be influenced by knowledge of relevant legislation and Transnet policies. The dedicated pollution control team that attends environmental incidences in the Port of Cape Town may have also contributed to the positive response percentages.

A few of the ME's and NME's responded "no" to the statements on whether waste and pollution incidences are taken seriously at the Port of Cape Town. Negative environmental experiences of individuals have the potential to influence perception and attitude negatively as it relates to environmental issues (Simaika & Samways, 2010; Cohen & Horm-Wingerd; 1993; Lindemann-Matthies *et al.*, 2013; Zang *et al.*, 2014; Clayton *et al.*, 2017). It is also a possibility that this group had negative experiences in relation to waste and pollution incidences in their work areas. Maybe this group is not aware of the relevant environmental legislation and of Transnet policies and procedures concerning their responsibilities to adhere to. Possibly these groups may not have received inductions of Transnet SHE related matters (Marpol, 1973; Republic of South Africa, 1998a & c; TNPA, 2015b & d).

6.2.3.4 Waste Licence Permit Holders

The ME's and NME's mostly chose the option of "yes" (70.0 and 79.5%, respectively) for the statement: "Waste incidences are being taken seriously at the Port of Cape Town". 30.0% of the ME's and 12.3% of the NME's chose the option of "no" (Figure 6.2.3a).

The ME's and NME's mostly chose the option of "true" (58.3 and 88.2%, respectively) for the statement: "Pollution incidences are being taken seriously at the Port of Cape Town". 41.7% of the ME's and 11.8% of the NME's chose the option of "false" (Figure 6.2.3b).

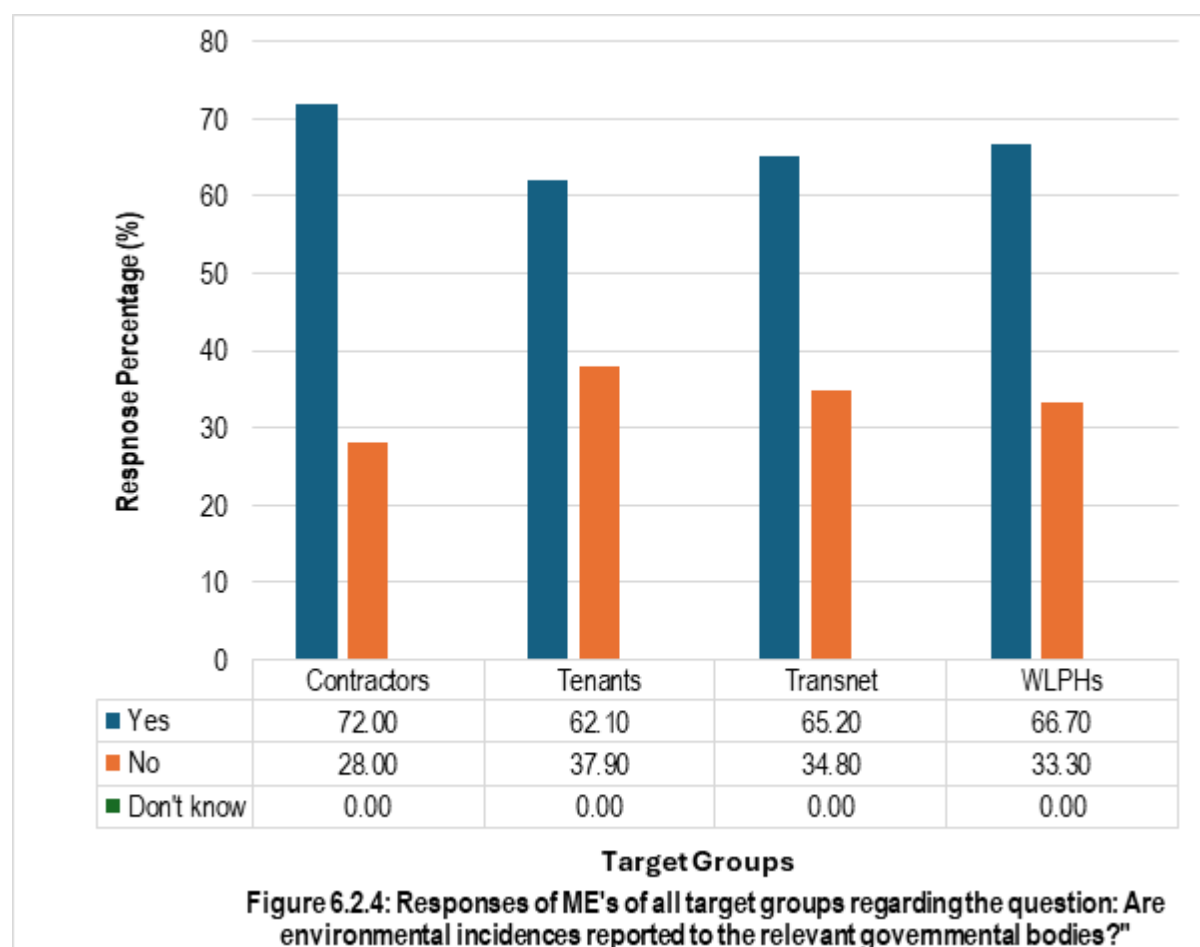
From the above results it can be deduced that the WLPH's are taking waste and pollution incidences seriously at the Port of Cape Town at least to most of the employees. The WLPH's has incidence procedures in place that incorporate waste and pollution (Drizit Environmental Cc, 2015; TNPA, 2016). Section 62 of the National Ports Act (no. 12 of 2005) requires port users to adhere to all environmental laws and regulations (Republic of South Africa, 2005). Handling of waste and pollution is the core business of WLPH's. Furthermore, the annual waste audits conducted by the TNPA ES revealed that there are environmental insurance policies in place in case of any waste incidences during operational activities that requires insurance intervention (TNPA, 2018d). In situations where WLPH's do not have the capacity to deal with larger waste and pollution incidents, they have agreements with larger service providers such as Drizit Environmental CC to ensure that their obligations are met (Drizit Environmental Cc, 2015). It is therefore possible that the legislation mentioned above, the environmental insurance policies and the agreements between smaller and larger WLPH's may have influenced the high positive response percentages from ME's and NME's. This can be seen as a reflection of a positive attitude with regards to waste and pollution incidents in the Port of Cape Town.

As previously indicated, 30.0% and 41.7% of the MEs responded negatively to the statements that relate to waste and pollution incidences being taken seriously at the Port of Cape Town. In 2020 DFFE visited the Port of Cape Town in relation to environmental incident and engaged TNPA to investigate the matter as the landlord. Then TNPA used one of their WLPHs to clear waste and pollution that took place in the port premises. The nature of the environmental incident was in violation with environmental legislation. The waste reception facilities were overflowing, during windy period the waste was blows all over the place, bad smell was being experienced and attraction of flies and rodents in the waste bin (DFFE, 2020a; Appendix F4). Then TNPA involved WLPHs to handle the situation in cleaning the surroundings and emptying of the waste skips. An interview was conducted with the local government. The response was found to align with some of the study findings on attitude. The following question was posed: According to you (local government), "What is your department's attitude towards the management of waste and pollution in the port environment?"

The response was: *...protocol amongst other procedures to ensure environmental compliance*”

It is evident that the response of the WLPs and the local government response were aligned. There was a lack of environmental compliance.

6.2.4 Responses of ME's of all target groups regarding the question: “Are environmental incidences reported to the relevant governmental bodies?”



There were no statistical significant differences between the ME's for all the target groups with regards to the question posed to them: “Are environmental incidences reported to the relevant governmental bodies?” $P > 0.05$ (Figure 6.2.4).

The uncertainty of the “unknown” response may be interpreted as a negative response and can be considered to be closer to a “no” response than a “yes” response, or even an indication of ignorance.

6.2.4.1 Contractors

The ME's overwhelmingly chose the option of "yes" (72.0%) for the question: "Are environmental incidences reported to the relevant governmental bodies?" Only 28.0% of the ME's chose "no" (Figure 6.2.4).

Most of the contractors indicated that they report environmental incidences to the relevant governmental bodies. Section 30 of NEMA (No. 107 of 1998), requires that all environmental incidents be reported to the relevant authorities. Failure to report can lead to a penalty of up to 10 million rand or imprisonment of up to 10 years (Republic of South Africa, 1998a). Furthermore, the National Ports Act (No.12 of 2005) in Section 56 states: (1) "The Authority (TNPA) may enter into an agreement with any person in terms of which that person, for the period and in accordance with the terms and conditions of the agreement, is authorised to...[amongst others] to operate a port facility, or provide services relating thereto operating in the dry docks and ensuring that the waste and pollution related matters are attended to. Failure to address waste related incidences or any incidences that may have a negative impact on the environment, may result in the suspension of the service for a reasonable period" (Republic of South Africa, 2005).

The contractors are also expected to submit an incident / accident management plan to be included in the SHEP file. There are procedures in place for incident / accident management for the contractors working in the port. The procedure indicates that all the incidents / accidents must be reported before the end of every shift. The requirements for notification to the client (in this case TNPA): Telephonic reporting to the Transnet Project Manager immediately and a flash report within 24 hours. Any incident that requires reporting to the local authorities must also be done. The investigation must commence within 7 days of the incident (Raubex Construction (Pty) Ltd, 2017). It is possible that the signed agreements, legislations, other control measures of the SHEP files and incident procedures in place influenced the response percentages from the contractor ME's positively. That reflected their attitude as far as environmental reporting of incidences to the relevant governmental bodies are concerned.

6.2.4.2 Tenants

The ME's mostly chose the option of "yes" (62.1%) for the question: Are environmental incidences reported to the relevant governmental bodies?". Fewer of the ME's (37.9%) chose the option of "no" (Figure 6.2.4).

The most tenants are reporting environmental incidents to the relevant governmental bodies. Section 30 of NEMA (No. 107 of 1998) requires that all the incidents be reported to the relevant authorities. There are penalties that are related to unreported incidents (Republic of South Africa, 1998a). Furthermore, in terms of Section 62 of the National Ports Act (No. 12 of 2005) it is required of the port users to comply with all the environmental laws and regulations. As port users' tenants are obliged to inform both the TNPA and the relevant local authorities of any incidence caused by their operations that had a negative impact to the environment within a period of 24 hours. Non-adherence may result in the suspension of the involved tenant's services for a certain period (Republic of South Africa, 2005; TNPA, 2015f).

All the incidents, including near misses must be reported. The investigation report must be made available for review to the management of the tenant, the TNPA including authorities. This requirement also applies to subcontractors (Republic of South Africa, 1998b; DCD Marine (Pty) Ltd, 2015a). Furthermore, the annual audits conducted by the TNPA ES revealed that tenants are reporting environmental incidences to the relevant governmental bodies, such as, SAPS, municipalities, DEFF, Provincial Government, Department of Water Affairs, and the TNPA (TNPA, 2019b&c). Therefore, the majority of the MEs revealed a positive attitude towards reporting environmental incidents to the authorities.

6.2.4.3 Transnet

The ME's mostly chose the option of "yes" (65.2%) for the question: "Are environmental incidences reported to the relevant governmental bodies?" Less of the ME's (34.8%) chose the option of "no" (Figure 6.2.4).

From the majority of the responses, it can be deduced that Transnet reported environmental incidences to the relevant authorities. Section 62 of the National Ports Act (No. 12 of 2005) requires of port users to comply with all environmental laws and

regulations (Republic of South Africa, 2005). The TNPA's legal department monitor non-compliance within Transnet on a quarterly basis (Appendix E5). Additionally, SHE Managers also request any non-compliances on a monthly basis (Appendix E6). The high "yes" response percentage possibly reflects a positive attitude towards reporting of environmental incidences.

There were however few of all the target groups (contractors, tenants, Transnet, WLPs) MEs that responded negatively to the question: "Are environmental incidences reported to the relevant governmental bodies?" This may be an indication of a negative attitude in relation to the reporting of environmental incidences to the relevant government authorities. In heading 4.2.1 - 2 (*Contractor and tenant responses (ME's and NME's) concerning environmental training programmes*) it was discussed that not all the port users especially the subcontractors receive induction training programmes. Then this also create a gap in communication between the contractor and the Risk / Environmental Specialist responsible for induction. The gap in communication identified result in subcontractor's employees not being made aware (inducted) of the relevant environmental legislations. Furthermore, the SHEP files end up not being assessed for its approval before the commencement of the operational activities. The ME's and NME's were knowledgeable of environmental legislations of all target groups, except only few with negative response as discussed in 5.2.7.1 - 4 (Figure 5.2.7). In terms of Section 62 of the National Ports Act (No. 12 of 2005) it is required of the port users to comply with all the environmental laws and regulations. These includes reporting of the incidents to both TNPA and the local government (Republic of South Africa, 2005, Republic of South Africa, 1998a&b). Under these circumstances environmental legislations and regulations end up not being adhered to. Among other issues it might be possible that other employees are not responsible for reporting environmental incidences due to job description, someone else from SHE is solely responsible especially at this level with the local government hence their response (GES, 2014; TNPA, 2015c; Transnet SOC Ltd, 2018b; TNPA, 2019b). In the interview with the local government, the officials responded to the question: "What is your department's attitude towards the management of waste and pollution in the port environment?" "...*reporting be clarified*". The local government feels that there is clarity required for when coming to reporting.... "*Include the pollution incident management and reporting protocol amongst other procedures to ensure environmental*

compliance...” There was an alignment in relation to negative attitude response of the target groups, and the government officials interviews response. It is therefore necessary for Transnet to pay attention to these gaps identified and address them.

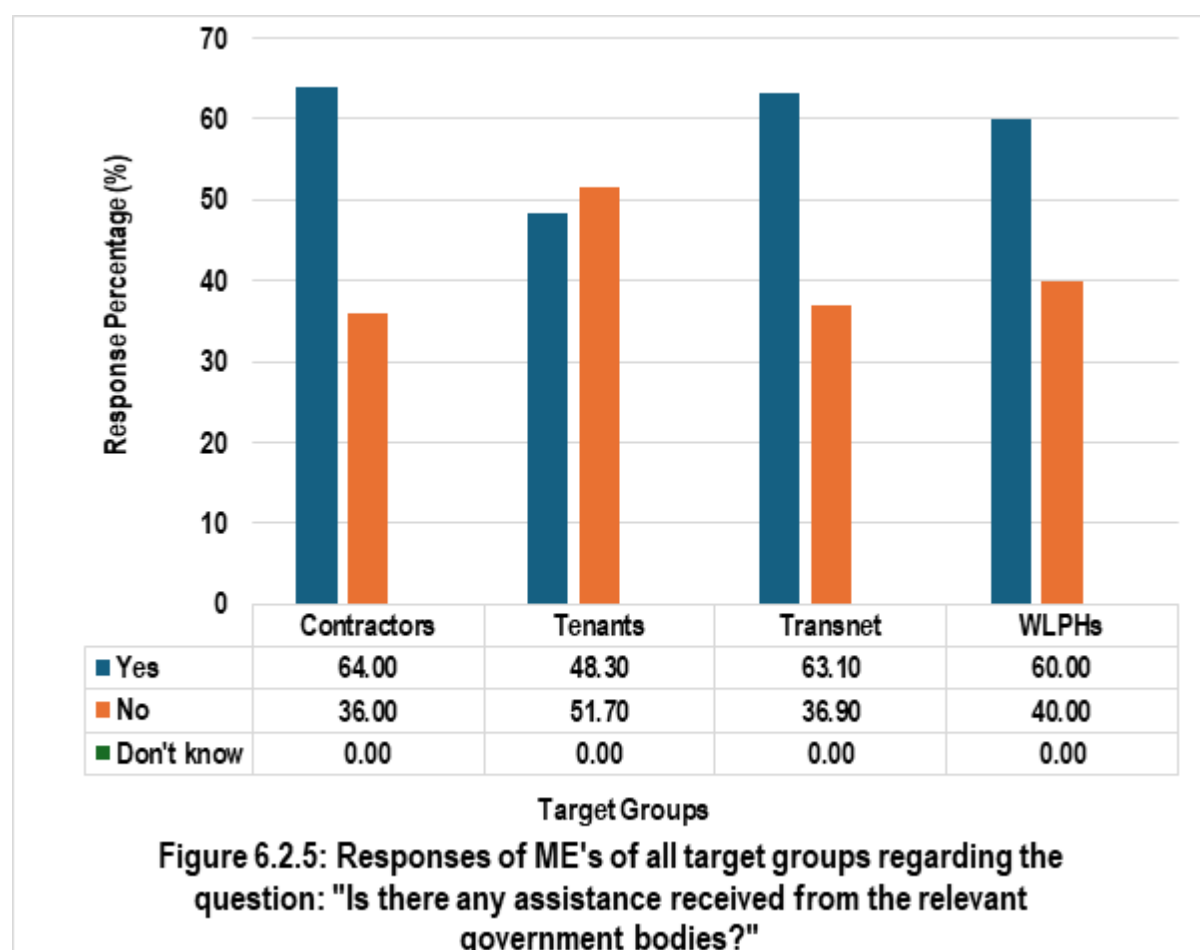
6.2.4.4 Waste Licence Permit Holders

The ME's mostly chose the option of “yes” (66.7 %) for the question: “Are environmental incidences reported to the relevant governmental bodies?”. Less of the ME's (33.3%) chose the option of “no” (Figure 6.2.4).

In general, the WLPH's seem to be reporting environmental incidences to the relevant local authorities. Section 30 of NEMA (No. 107 of 1998) requires that all environmental incidents be reported to the local authorities. Failure to report could lead penalties (Republic of South Africa, 1998a). Furthermore, Section 62 of the National Ports Act (no 12 of 2005) requires that port users comply with all environmental laws and regulations. The WLPH's, as port users, are therefore obliged to inform the TNPA and local authorities of any incidence caused by them. Failure to do so may lead to the TNPA revoking or suspending the license permit for a reasonable period (Republic of South Africa, 2005). Section 20 of the National Water Act (No. 36 of 1998) indicates that all incidents that are likely to have a detrimental effect on the environment must be reported to the Department of Water Affairs, SAPS and any other relevant authorities (Republic of South Africa, 1998b).

Annual waste audits conducted by the ES of TNPA revealed that the WLPH's are reporting environmental incidences to the relevant local authorities such as the SAPS, municipalities, DEFF, provincial government, SAMSA, Department of Water Affairs and TNPA (TNPA, 2020b). It is thus possible that legislative requirements influenced the reporting of environmental incidents to the governmental authorities. The relatively high response percentages can be seen as a reflection of a positive attitude towards reporting environmental incidents to the relevant authorities.

6.2.5 Responses of ME's of all target groups regarding the question: "Is there any assistance received from the relevant governmental bodies?"



There were no statistical significant differences between the ME's for all the target groups with regards to the question posed to them: "Is there any assistance received from the relevant governmental bodies?" ($P > 0.05$) (Figure 6.2.5).

The uncertainty of the "Don't Know" response may be interpreted as a negative response and can be considered to be closer to a "no" response than a "yes" response, or even an indication of ignorance.

6.2.5.1 Contractors

Most of the ME's chose the option of "yes" (64.0%) for the question: "Is there any assistance received from the relevant governmental bodies?". Less of the ME's (36.0%) chose the option of "no" (Figure 6.2.5).

From the results it seems like there is assistance regarding SHE issues provided to the contractors from the relevant governmental bodies. Quarterly meetings are held at the Port of Cape Town TNPA premises between Transnet National Ports, Transnet Port Terminals, South African Maritime Authority, and the South African Association of Ship Operators & Agents (SAASOA). These are governmental bodies with platforms that continue to assist port users to address their concerns that requires government's interventions. The majority of the contractors are registered with SAASOA. Furthermore, there are Ship Repairers Forums. These meetings are held in order to improve the conditions as far as ship repairs and maritime related issues are concerned (Appendix E7; Appendix E8). Additionally, SAMSA as government institution continue to communicate marine notices to these organisations in relation to maritime issues for industries (SAMSA, 2017). It is possible that the high response for the "yes" option by the ME's is the reflection of positive attitude of contractors influenced by the engagement sessions with relevant governmental bodies.

Some of the MEs provided a "no" response. It is possible that those contractors whose MEs indicated "no" may not be registered with SAASOA, and therefore not involved in the seatings of these forums and meetings. Or it could either be that SAMSA notices that are being communicated to the industries, not all are receiving such by the contractors which may possibly lead to "no" response.

6.2.5.2 Tenants

The ME's mostly chose the option of "no" (51.70%) for the question: "Is there any assistance received from the relevant governmental bodies?" 48.3% of the ME's chose the option of "yes" (Figure 6.2.5).

The small majority of the tenant ME's indicated that there is no assistance received from the relevant governmental bodies. In heading 4.2.5.2 for the question: "Do you collaborate with outside stakeholders concerning environmental training programme?" the results also showed that most of the tenants provided a "no" response. Similar findings were noticed found for awareness in heading 3.2.7.2. Although the tenants have preferred to conduct in-house training and awareness, only a few employees were being released to attend workshops organised by the government. It seemed like this was to allow for operational activities to continue. In the interview conducted with

the governmental officials, a concern was raised about tenant management in the Port of Cape Town. Maybe there is a need for further investigation to understand possible gaps between Port of Cape Town tenants and governmental bodies to strengthen the relationship between the two entities should there be a lack. However, almost half of the tenant MEs answered “yes” to the question. Therefore, some tenants feel that assistance is given by governmental bodies, while others do not feel that they get enough assistance from governmental bodies. The interviews with the local government officials stated that “... *Engage authorities in auditing of tenants in the Port of Cape Town...*” and “... *As Transnet to invite authorities to be involved in management of pollution in the port...*”

The response from local government officials shows a positive attitude towards the port waste and pollution related matters. There is a great interest of assistance when needed. It could therefore, possibly mean that the assistance identified to be given to the port may explain the reason for “no” responses.

“...Engage authorities in auditing of tenants in the Port of Cape Town...”.

6.2.5.3 Transnet

The ME’s chose the option of “yes” (63.1%) for the question: “Is there any assistance received from the relevant governmental bodies?” Fewer of the ME’s (36.9%) chose the option of “no” (Figure 6.2.5).

According to the results most Transnet ME’s feel that there is assistance received from relevant governmental bodies. Other governmental stakeholders such as the South African Maritime Safety Authority (SAMSA) and the Department of Transport (DoT) provide training workshops that focus on environmental protection procedures and new regulation requirements, among others (SAMSA, 2020/19). Furthermore, Transnet also participates in INTERPOL’s Pollution Crime Working Group (PCWG) and the Environmental Compliance and Enforcement Committee (ECEC), including the industrial waste management forum. These groups work towards intensifying their efforts to fight pollution (DEA, 2018a; DEA, 2018b). These teams meet on an annual basis on issues related to pollution-related crime. These are platforms where information is shared on the best practices and discussions are held on issues that threaten the environment. Ports have been inspected on several occasions to keep a check on the activities of port users which are beneficial to the ports. The Department

of Environmental Affairs takes a leading role in this regard. The majority of the MEs of Transnet demonstrated a positive attitude which is reflected in the response percentages. This is due to good practices in collaborating with the governmental bodies where assistance is constantly provided.

About a third of the respondents indicated a “no” response. It could be possible that these ME’s due to their job responsibility they are not involved with this department that may be relevant to SHE related matters for assistance. They may also not pay attention to the government invitation to workshops to attend because of possible relevancy to their job and not interested. *The local government responses were also positive on this matter of attitude... “As specified indicated earlier, the responsibility rests with the Port of Cape Town and regulator is the city...”; and “...In emergencies, city and DEADP will assist with pollution control at ports expenses...”*

6.2.5.4 Waste Licence Permit Holders

The ME’s mostly chose the option of “yes” (60.0%) for the question: “Is there any assistance received from the relevant governmental bodies?” Fewer of the ME’s (40.0%) chose the option of “no” (Figure 6.2.5).

The core business of WLPH’s is the handling and management of waste. Due to the nature of this business the legislative requirements play an important role to be recognised in this sector and to get waste licence permits. Then any interested waste organisations do attend workshops or seminars offered by government that deals with environmental and waste management issues. There are regular workshops also conducted for inputs from industries for improvement in environmental and waste management issues for possible changes in legislation and to foster improvement in this sector (DEA, 2014/5; DEFF, 2020a; Appendix C11). In this manner the WLPH’s continue to receive assistance from the relevant governmental bodies. It is possible that the attendance of these workshops organised by governmental bodies contributed to most of the WLPH’s MEs responding with “yes” to this question.

However, over a third of the respondents indicated “no”. It could be that those MEs are not responsible for SHE related matters in their organisation. Addition to this, it is highly possible that they may not also attend the workshops organised by the relevant

governmental bodies. Their response of “no” may not per se mean a negative attitude because SHE matters are not their job.

PERCEPTION

ABSTRACT

The perception is considered as a particular way in which individual understand, view, or think about something. The human being receives knowledge of the world through the primary process of perception. There are many factors that influence the perception of every human being. These factors are values, beliefs, norms and resources. Perception does not also exclude the individual's experience of their upbringing or growth or how they were raised and also the environment in which they were exposed. Environmental perception is defined "as a multi-dimensional phenomenon, as a transactional process between the person and the environment". In terms of how a person thinks of pollution, the perception is more than factual knowledge. The data has been analysed by using SPSS 25 software programme and Microsoft Office Excel. The study revealed that there is variety of opinion in the case of certain issues whether waste and pollution management is a problem or not. The Port of Cape Town is big with different types of operational activities that may require different approach from one to the other. Inconsistency of not being uniform in the implementation of environmental programme across the port contribute to different perception whether waste and / or pollution management is a problem or not. Despite this different view, In general, the respondents were positive across all target groups in their perception of the future of the port environment, compared to their past and present perceptions. They have shown a positive and optimistic future outlook in terms of the port environment.

7.1 INTRODUCTION

Many current global challenges in the environment are the result of human practices and negative perceptions towards the environment (Takahashi *et al.*, 2015; Ukaogo *et al.*, 2020). Solutions to environmental problems require a collective approach and a sense of individual responsibility. Up to 85% of the global population lives in developing countries where economic development is high on the agenda. The increasing populations of developing countries can also be linked to increasing human activities and pollution (Bahae *et al.*, 2014). Tied to economic development is increasing shipping and related activities in ports. However, linked to economic development is increasing threats to the environment due to pollution resulting from, amongst others, port users' activities (Luo & Yip, 2013; Chiu *et al.*, 2014; Barnes-Dabban *et al.*, 2017). The natural environment is increasingly unable to accommodate the rising levels of pollution that is created due to increasing anthropogenic activities (Ifegbesan & Rampedi, 2018; Cetin *et al.*, 2023a&b).

Most recent studies about port environments pay much attention to issues about sustainable development and green ports (Girard 2013; Lam & Notteboom, 2014; Carpenter *et al.*, 2018; Li *et al.*, 2019; Haezendonck, 2020; Qi *et al.*, 2020). It has been proven that ports have, for many years, played a vital role in advancing the economies of many countries and regions globally. Nonetheless, port operational activities continue to produce pollution, which might affect the ports negatively. In an attempt to solve this problem, researchers investigate methods of reducing port environmental pollution by optimising the strategy of the port operations and adjusting the equipment used for the operations in the port (Li *et al.*, 2019; Peng *et al.*, 2019).

Research that is focused on port users' perceptions regarding environmental pollution is rarer. Understanding how humans perceive the environment is crucial to help manage pollution created by port activities. It is necessary to understand stakeholder perceptions concerning port operations and their impact on the environment (Lozano *et al.*, 2020). Research on people's perception of environmental issues is very important (Armah *et al.*, 2015; Bakuwa, 2015). The success of environmental and pollution management relies on understanding people's perceptions towards the environment. In order for anticipated human practice towards the environment to change it is important to know the formation of environmental perceptions (Meyer,

2018). In the study conducted by Peterlin *et al.* (2005) argued that in the Port of Koper the perception of the employees involved in the port activities compared to the public in general, their results response differed. Those employees involved in port activities revealed port activities significantly less impact to the environment compared to the public in general. The same port conditions but perceived differently.

Mellisa (2002) considers perception as a particular way in which individuals understand, view, or think about something. The human being receives knowledge of the world through the primary process of perception. There are many factors that influence the perception of every human being. These factors are values, beliefs, norms and resources (Bardi & Schratz, 2003; Barnhart, 2008; Mariwah *et al.*, 2010). Perception does not also exclude the individual's experience of their upbringing or growth or how they were raised and the environment in which they were exposed (Starovoytova & Namango, 2018). Ittelson (1973) defined environmental perception as "a multi-dimensional phenomenon, as a transactional process between the person and the environment". Taboada-González (2011) described environmental perception as a manner in which people are aware and how they relate to their environment.

In terms of how a person thinks of pollution, perception is more than factual knowledge. An individual's level of pollution risk perception is considered in the expression of that individual's exposure he had before with matters such as toxic chemicals, land development, agricultural runoff, waste disposal, water, or air pollution (Willett, 2011). Both the society and social media have a great potential to influence the individual's level of risk perception to environmental hazards (Weber *et al.*, 2000). There are three steps that summarise environmental risk perception. The first step is the acquisition of information, followed by the second step which is the interpretation and synthesis of diverse sections of information, and thirdly, is the understanding of the same information in view of prior knowledge, perception, and attitudes (Burger, 2008). The sharing of information concerning a source and the receiver is expected to lead to improved risk management and change of behaviour. To understand both the hazards and risks, knowledge acquisition plays a very important role (Burger, 2008).

There are survey instruments for assessment of environmental risk perception. They try to study the individual's knowledge and the thinking behind issues of pollution. The

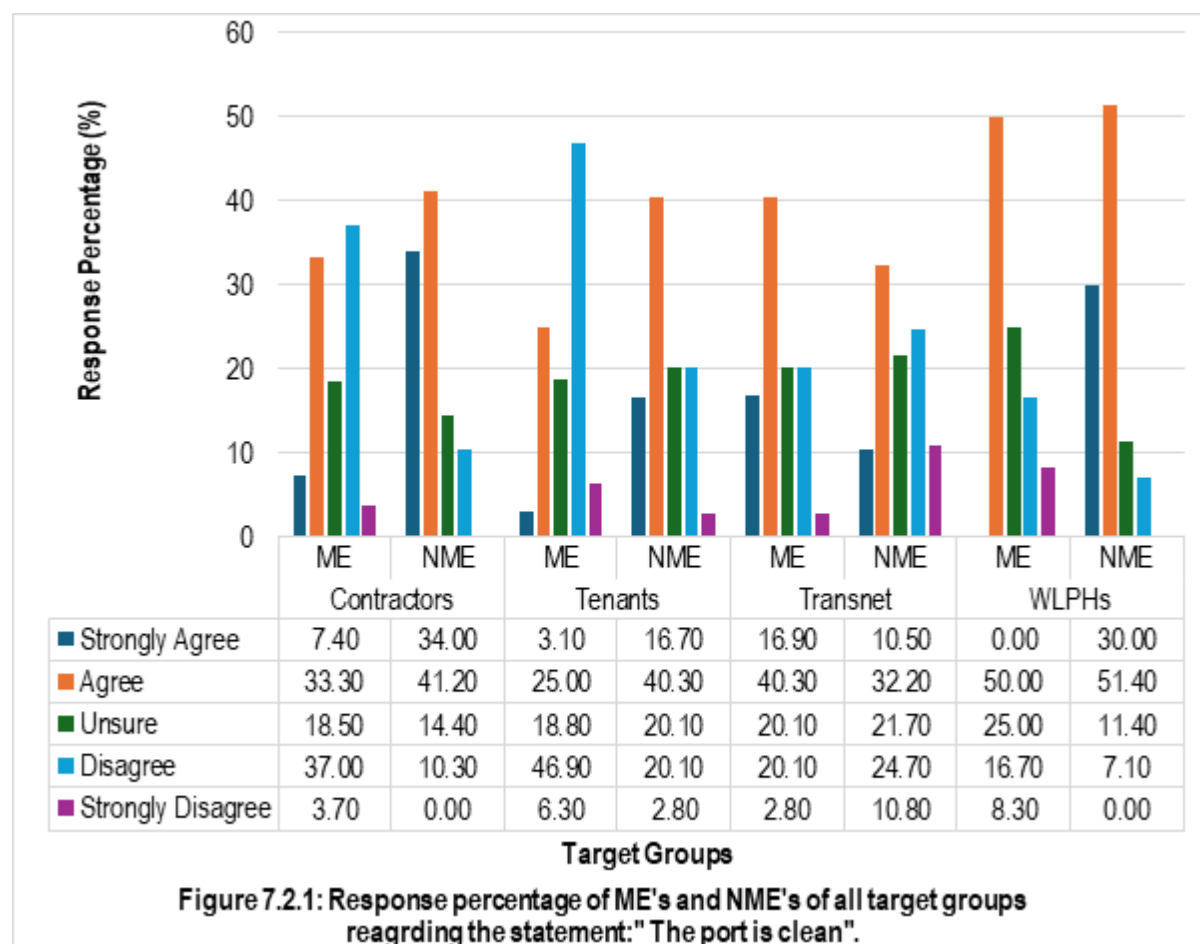
concern on these issues of pollution are the hazards that may cause harm and the consequential behaviours on health (Brewer *et al.*, 2004; Brewer *et al.*, 2007).

Without understanding the port industrial user's perception, it is likely that the current practice will continue, despite the laws, standards, and legislation in place. In understanding human behaviour's sensitivity towards the environment, the research findings are anticipated to help develop a strategy that will address the current situation and assist in formulating the best environmental management practice in the Port of Cape Town. The objectives of the study were: To determine the perceptions of port users regarding waste and pollution management; and to identify the potential barriers and opportunities for the port as it pertains to waste and pollution management. Further, to review relevant documents of Transnet as they relate to environmental perception in the Port of Cape Town. Also, to engage relevant local government departments with interviews regarding environmental perception at the Port of Cape Town.

7.2 RESULTS AND DISCUSSION

When reference is made to Transnet in the results it refers to the Transnet National Ports Authority (TNPA). The contractors, tenants, Transnet and Waste Licence Permit Holders (WLPH's) were the target groups of this study, as well as specific government department officials, as detailed in chapter 2. Self-administered questionnaires were used on the managerial employees (ME's) and the non-managerial employees (NME's) of the four target groups. Data was collected from the government department officials by means of structured interviews. The collected data was tabulated and coded (Appendix 10.1&2). An explorative descriptive study and statistical analysis was done using SPSS 25 software and Microsoft Office Excel (Shil *et al.*, 2013; Appendix 12.1&2). The data mainly consists of non-parametric ordinal and nominal data. Chi square analysis was used to search for statistically significant influences of independent variables on dependent variables.

7.2.1 Responses of ME's and NME's of all target groups regarding the statement: "The port is clean"



There were no statistical significant differences between the ME's and NME's of all the target groups with regards to the statement: "The port is clean" ($P > 0.05$) (Figure 7.2.1).

7.2.1.1 Contractors

The ME's and NME's chose the options of "strongly agree" (7.4 % and 34.0 %, respectively) and "agree" (33.3 and 41.2%, respectively) for the statement: "The port is clean". 18.5% of ME's and 14.4% of NME's chose the option of "unsure", while 37.0 % and 10.3 %, respectively chose "disagree" and 3.7 % and 0 %, respectively chose "strongly disagree" (Figure 7.2.1).

The ME's were found to be divided in their perception whether the port is clean or not. Most ME respondents chose the "disagree" options, while the second most chosen option is "agreed".

In heading 3.2.4.2 (*Pollution and water related awareness for contractors*), it was indicated that before the contractors start with any operation onsite (mostly in the dry docks) ME's of Transnet take contractor representatives (MEs) on a site briefing session and walkabout where awareness is raised of specific matters. During these site briefings and walkabouts both parties visit the operational areas where the work will be done. It was indicated that there are instances where previous contractors left the operational site behind with "pollution" and "water" contamination issues. In some cases, the working area were found to be clean. It is possible that certain ME's that agreed that the port is clean experienced a clean port during their walkabout and site visit. In cases where the ME's disagreed that the port is clean, they may have experienced port operational areas in an unclean state when they did the initial site visits and walkabouts. An awareness and acceptance of a person play a vital role in the perception process (Wyer Jr and Srull, 2014). According to Starovoytova & Namango (2018) perception includes the experience of individuals and the environment they are exposed to. Therefore, the differences in perception of ME's may have been influenced by their own individual experiences of the port environment.

In contrast the NME's mostly chose "strongly agree" and "agree" and thus felt that the port is clean. As indicated above and in heading 3.2.4.2 (*Pollution and water related awareness for contractors*), more often during the walkabouts the ME's would be onsite to inspect the operational areas. In such cases where "pollution" and "water" contamination issues were left behind by previous contractors, the TNPA pollution team would be deployed to clean the environment before the contractors start with their operations. The NME may not experience any unclean environment when arriving onsite after the lease agreement has been signed by the MEs of TNPA management. It is possible that the time the NME's go on site for operations, the work area has been cleaned by the pollution team of TNPA. The experience of finding the operational area clean, might have influenced the NME's perception concerning the statement that the port is clean. Furthermore, in heading 3.2.4.1 (*waste and oil spill related awareness for contractors*) it was revealed that ME's and NME's received the necessary

awareness programmes and one of the NME representatives is required to conduct weekly SHE housekeeping inspections to ensure that “waste” and “oil spill” issues do not become problematic. Should it happen in the inspection that housekeeping is found to be poor with unnecessary “waste” and “oil spills”, then action needs to be taken (TPT, 2012; TNPA, 2020c). This control measures to ensure the working environment of the contractors is always clean might have contributed to the NME’s positive response perception concerning the statement that “the port is clean”.

18.5% of ME’s and 14.4% of NME’s chose the option of “unsure”. Some contractors leave their work areas in a clean state, while others leave their work areas in an uncleaned condition (Appendix F1). This scenario can be experienced in work areas quite close to each other, like in the dry docks. This creates a sense of confusion on whether the area in question in the port is clean or not, hence the “unsure” responses from certain ME’s and NME’s. An external audit report which was conducted in the Port of Cape Town in 2014, indicated that some parts of the dry docks were clean while other parts were not. The report recommended that the Transnet National Ports Authority pay more attention to the parts which were found to be in an unacceptable state (GES, 2014). Freeman *et al.* (2012) argued that the individual’s perception on the environment is the reflection of their experience and memories. Bennett (2016) stated that a group of people or individuals can perceive the same environment conditions but provide widely different responses.

7.2.1.2 Tenants

The ME’s and NME’s chose the options of “strongly agree” (3.1 % and 16.9%, respectively) and “agree” (25.0 % and 40.3 %, respectively) for the statement: “The port is clean”. 18.8 % of ME’s and 20.1 % of NME’s chose the option of “unsure”, while 46.9 % and 20.1 %, respectively chose “disagree” and 6.3 % and 2.8 %, respectively chose “strongly disagree” (Figure 7.2.1).

The majority of the tenant ME’s chose “disagree” about the statement that the port is clean. This is followed by “agree” and “unsure”. For the most part the tenant ME’s perceive that the port is not clean. However, this perception is not unanimous, as indicated above. Several complaints from the tenants were sent to the port environmental department concerning non-collection of waste and overflowing of bins

where waste was blown around by the wind (Appendix F2). In a report which was done in 2009, with one of the tenants, which is still in the port, the report indicated that littering was a huge problem (TNPA, 2009). All these resulted in the port environment being in an unsightly state. This could be perceived as an indication of a possible culture of littering in certain parts of the port and what they might have experienced in the port. This can thus explain why some tenant ME's perceived the port to be in an unclean state, while others felt that the port is clean, as evidenced in Figure 7.2.1. According to Rahman and Post (2012), the negative impact on the port environment may result in a risk in terms of people's perception. Jung *et al.* (2011) argued that people may differ in perception while referring to the same environment. This might be due to different experiences about that particular location.

Most of the tenant NME's and ME's perceived that the port to be clean. In heading 3.2.1.2 (*The NME's responses in relation to the question: "Think about waste, what comes to mind?"*), NME's stipulated that the "port clean-up" was the first thing that came to mind for this question. The NME's participate physically in cleaning the port environment. Their personal involvement and efforts in cleaning the port might be the experience that have influenced their perception that the port is clean. The response might be to a large degree due to this experience. Suksri *et al.* (2021) argued that the experience of individuals does influence the perception as far as the environment is concerned.

18.8 % of ME's and 20.1 % of NME's tenants chose the option of "unsure". The work being performed by this group maybe was not related to environmental issues. Another reason for the "unsure" choice could be that they did not want to give an opinion, or they were confused because some port areas are clean while other parts are not clean. It was previously found that in certain areas of the port were clean places while in others it was not the case (TIA, 2014; TNPA, 2022c; Appendix F3).

7.2.1.3 Transnet

The ME's and NME's chose the options of "strongly agree" (16.9 % and 10.5 %, respectively) and "agree" (31.5 % and 32.2 %, respectively) for the statement: "The port is clean". 19.1% of ME's and 21.7 % of NME's chose the option of "unsure", while 28.1 and 24.7 %, respectively chose "disagree" and 4.4 % and 10.8 %, respectively chose "strongly disagree" (Figure 7.2.1).

There is quite a relatively even spread of responses from Transnet ME's and NME's between "agree", "unsure" and "disagree". The understanding of environmental conditions acquired of individuals may be different depending on everyone's previous experience and the environmental surroundings which is related to perception (Ittelson, 1976; Heimlich 1993; Srisawat, 2015; Suksri, 2021). The Port of Cape Town has a single pollution control vessel that was built in 1999. The expected life span of this craft was 15 years, which has been exceeded by at least 8 years. Furthermore, the vessel was designed for collecting debris and small-scale dredging in rivers. It was not designed for coastal environments; hence it is constantly facing operational difficulties especially when heavy wind conditions are prevalent, resulting in a compromised ability to manoeuvre and work at its optimum level during such adverse conditions. The condition of the vessel due to its age is also poor and it is not fitted with the equipment necessary to implement an effective and quick marine clean-up operation. The vessel frequently breakdown and thus require constant maintenance (TNPA, 2021). During the breakdown depending on the period of the repairs the port experiences a challenge of unsightly waste and pollution on the water (TNPA, 2021). This situation with the pollution control vessel results is an inconsistent situation in terms of cleaning up operations of the port waters. These experienced challenges may have contributed to the varying responses from Transnet ME's and NME's between "agree", "unsure" and "disagree". An interview was conducted with the Solid Waste Management Department of the City of Cape Town which gave a view of a recommendation. The interview responded to the statement in understanding their perception regarding waste and pollution at the Port of Cape Town. The response was: *"More can be done to prevent wind-blown litter and spillages into the ocean"*.

The size of the Port of Cape Town environment on land is 253ha and the water area is 9163ha. The services rendered span across marine, container, general cargo, fresh

produce, fishing industry, ship repair, offshore and port services with hinterland connectivity (TNPA, 2014d). The size of the port and the activities undertaken might have contributed to the variable responses from ME's and NME's. Some parts of the port may be in an acceptable condition while other parts may be in an unacceptable state in terms of cleanliness. Also, different operational requirements in different parts of the port may contribute to some parts of the port appearing less clean than other parts. Houde (2007) argued that ecological knowledge is a tool that can be used to better understand the environment with their differences. This tool has six faces of characteristics that can assist in understanding the dynamics of the environment, namely, (i) facial observations that look into classifications, naming of the places, the description of the environmental components, understanding the interconnections; (ii) management systems which deals with practices adapted to context; (iii) past and current users which is more on land use pattern, occupancy and history of the site; (iv) ethics and values; (v) culture and identity; (vi) cosmology. These characteristics are key components that contribute to understanding a particular environment. Bennett (2016) stated that a group of people or individuals can perceive the same environmental conditions but provide widely different responses. The different environmental conditions of the port might have influenced the ME's and NME's varying perceptions from respondents. In the interview, which was conducted with the government officials, the response was: *"Ports are well managed, but more can be done to create awareness and manage the impact on water inside the ports.* It is evident that there is a room for continuous improvement concerning the port environment.

19.10 % of MEs and 21.70% of NME were "unsure" with regards to the issue of cleanliness of the port. Maybe this group is not involved in environmental related issues like port clean-ups due to job descriptions that are not directly related to environmental issues. The port is relatively large and there are different operational activities taking place in the port environment. If port users do not manage waste in an environmentally acceptable manner, certain operational activities may contribute excessively to the production of waste that will most likely have negative effects on the environment (Naidoo, 2015; Argüello 2020). Furthermore, in 2022 an Internal Assurance Audit Level 2 (IAAL2) report indicated that some of the TNPA business units and tenants were overflowing waste skips around the port, while certain other

areas were compliant (TNPA, 2022c). This may have contributed to the ME's and NME's to choose "unsure" because the condition of the port varies from one location to the next..

7.2.1.4 WLPH's

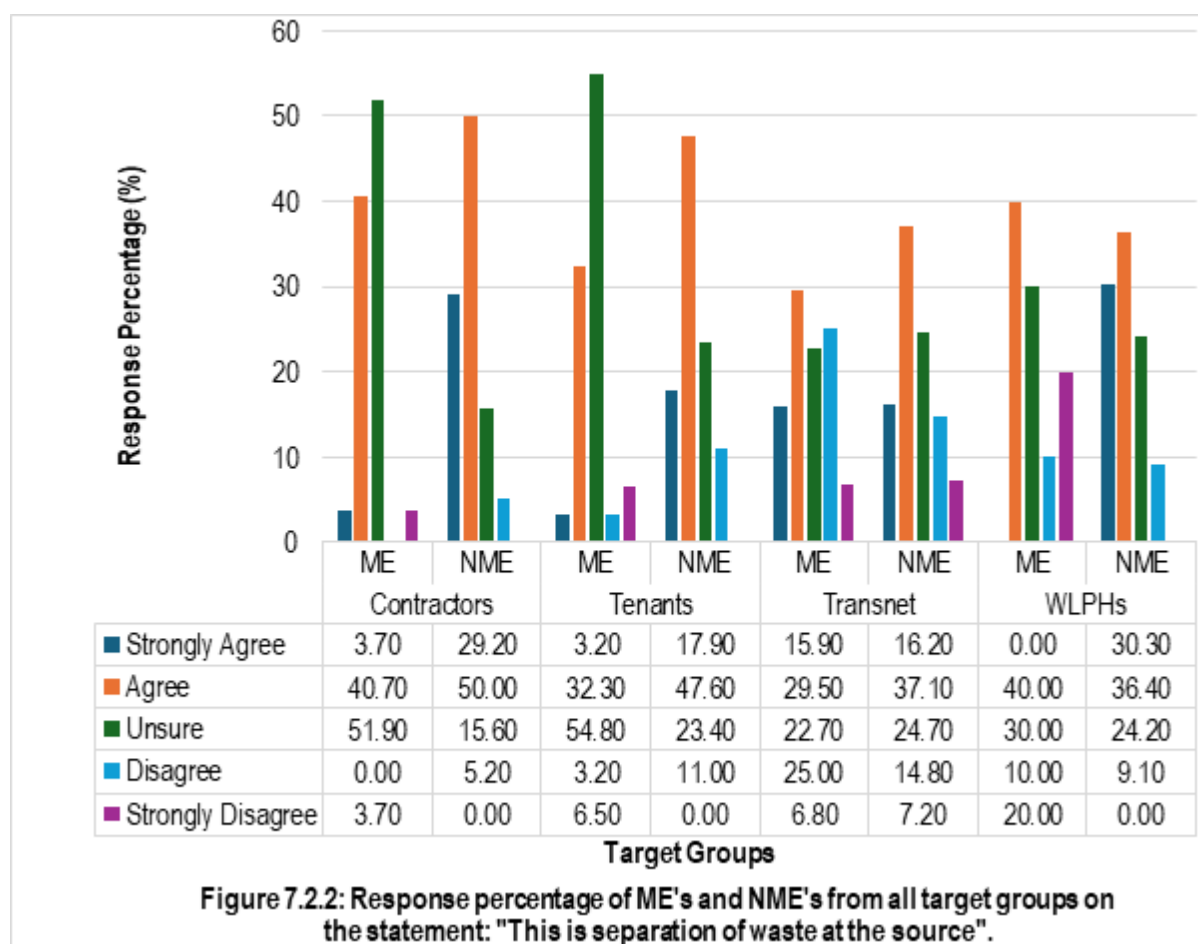
The ME's and NME's chose the options of "strongly agree" (0.0 % and 30.0%, respectively) and "agree" (50.0 and 51.4%, respectively) for the statement: "The port is clean". Other ME's (25.0%) and NME's (11.4 %) chose the option "unsure". Some ME's and NME's chose the options of "disagree" (16.7 and 7.1 %, respectively) and "strongly disagree" (8.3 % and 0.0 %, respectively) (Figure 7.2.1).

The majority of the WLPH ME's and NME's perceive the port as clean, as most of the respondents chose "agree" or "strongly agree" (Figure 7.2.1). The ME's receive calls for any waste collections that need to take place in the port. Then the ME's will direct the relevant NME's that are responsible for collection of waste in the port and dispose it at an appropriate landfill site. Due to their experience of the daily collection of waste in the Port of Cape Town, it could possibly have influenced their response percentages in a positive way. Their role in waste management and disposal could have contributed to their positive perception regarding the cleanliness of the port. This is further emphasised in heading 6.2.2.4 (*Waste Licence Permit Holders*) on attitude, where the ME's and NME's revealed that they consider waste outside of their work environment as their responsibility.

Fewer of the ME's (25.0%) and NME's (11.4%) chose the option of "unsure" (Figure 7.2.1). This group of ME's may not be directly responsible for receiving the calls made from the port for their organisation's action. This may also mean that the group of NME's who chose "unsure" may not have been informed of any port waste related matters. This group of NME's may be more indirectly involved. It is possible that their functions are not directly related to the removal of waste in the port activities. Furthermore, their duty may not have given them an opportunity to go to the port because the WLPH's are not located within the port; they are outside of the port premises which may be considered as part of public. There is a high possibility for this group not to have an idea of the condition of the port environment although some of their colleagues are involved in port activities. those directly involved in port activities

had a different response to those that were not involved, their perception differed. Hence those not involved indicated unsure as a reflection of their response in the statement “the port is clean”.

7.2.2 Responses of ME’s and NME’s of all target groups regarding the statement: “There is separation of waste at the source”



There were no statistically significant differences between the ME’s and NME’s of all the target groups with regards to the statement: “There is separation of waste at the source” ($P>0.05$) (Figure 7.2.2).

7.2.2.1 Contractors

The ME’s and NME’s chose the options of “strongly agree” (3.7 % and 29.2 %, respectively) and “agree” (40.7 % and 50.0 %, respectively) for the statement: “There is separation of waste at the source”. 51.9 % of the ME’s and 15.6 % of the NME’s chose the option of “unsure”. Only a few NME’s chose the option of “disagree” (7.1 %) and only a few ME’s chose the option of “strongly disagree” (3.7 %) (Figure 7.2.2).

Most of the contractor ME's chose "unsure" followed by "agree", while most of NME's chose "agree" followed by "strongly agree" (Figure 7.2.2). The National Waste Management Strategy (NWMS) (DEA, 2011) is a vehicle to achieve the objectives of the NEM: Waste Act 59 of 2008 (Republic of South Africa, 2008a). The NWMS promote the separation of waste at the source (DEA, 2011). Valkenburg *et al.* (2008) argued that separation of waste is a crucial fundamental principle and an effective way to manage waste. In heading 5.2.7.1 (*Contractors*) it was revealed that the ME's and NME's are informed of relevant environmental legislations. It is thus possible that knowledge of the legislation together with the direct experience on-site might have influenced their positive perception response that waste is separated at the source. Furthermore, in heading 5.2.4.1 (*Contractors*) ME's and NME's indicated that the waste reception facilities were clearly marked for type of waste. Saheed (2017) argued that the labelling of waste facilities promotes waste segregation on-site. It is thus possible that these were contributing factors that led to ME's and NME's positive perception that waste is separated at the source.

Only a few of the ME's and NME's chose the options of "disagree" or "strongly disagree" (Figure 7.2.2). An internal audit conducted by the TNPA (2019a) on NEM: Waste Act (No. 58 of 2008) compliance indicated that some parts of the port did not adequately separate waste. The dry docks are among the areas of the port where many contractors operate simultaneously. The audit found these areas to be only partially compliant, dry docks found to be problematic in relation to separation of waste. In contrast waste was found to be adequately separated in the study conducted at the Richards Bay Port in most operational areas (Naidoo, 2015). The negative perception of some of the ME and NME respondents is thus in line with the findings of the TNPA (2019a) report. Although the general perception is that waste is separated at the source, it does not happen to an adequate level in all parts of the port.

A high percentage (51.9 %) of the ME's chose the option of "unsure", while 15.6% of the NME's chose "unsure". There are cases where not all the ME's and NME's are directly responsible for waste related matters. However, it is crucial to be involved in one way or another, especially the ME's as the leaders of the organisation in their respective roles. Their involvement can be critical in motivating other employees in the organisation. When ME's are empowered, they are likely to lead by example to have

NME's that are willing to embrace changes in environmental initiatives and proactively reduce the processes in the organisation that are harmful (Daily & Huang, 2001; Daily *et al.*, 2012). Their response might be the reflection of not being involved in environmental issues. The Human Resources (HR) department in organisations can play a vital role to encourage the ME's and NME's to work together with their peers to deliver on environmental issues without being ignorant of them (Pellegrini *et al.*, 2018; Daily *et al.*, 2012).

7.2.2.2 Tenants

The ME's and NME's chose the options of "strongly agree" (3.2 % and 17.9%, respectively) and "agree" (32.3 % and 47.6 %, respectively) to varying degrees for the statement: "There is separation of waste at the source". 54.8 % of the ME's and 23.4 % of the NME's chose the option of "unsure". The ME's and NME's chose the options of "disagree" (3.2 % and 11.0 %, respectively) and "strongly disagree" (4.4 % and 0 %, respectively) to a lesser degree (Figure 7.2.2).

Most of the ME's were "unsure" whether waste is separated at the source. The second most ME respondents agreed that waste is separated at the source. A report by DFFE (2020a), based on an inspection at the Port of Cape Town, found that in one of the tenant areas wastes were not separated at the source and that waste reception facilities were overflowing (Appendix F4). The high level of uncertainty amongst many tenant ME's could be due to their functions that may not directly deal with waste management. However, this high level of uncertainty could also be due to them not being adequately involved in matters of waste management. There could be a possible element of ignorance regarding waste management issues, and in this case, waste separation, in tenant ME's. Pellegrini *et al.* (2018) argued that the managers should be involved in environmental issues to influence others in their organisation. The human resource department in an organisation can play an important role of nurturing a culture of peer involvement in environmental activities. The concept of peer involvement promotes participation of ME's and NME's in environmental issues of the organisation (Srinivasan & Kurey, 2014).

Most of the NME's were confident that waste was indeed separated at the source as evidenced by their "agree" and "strongly agree" responses. However, the second most NME's were "unsure" whether waste is separated at the source. The NMEs confidence that waste is separated at the source may be due to their direct involvement at the operational level. Simpson & Samson (2010) argued that empowered NME's can make their own decisions. They can identify and quickly rectify operations that are harmful in their activities for the benefit of the environment. For instance, the NME's can freely identify the processes in the operational activities that can be recycled and separate those identified material for recycling purposes and eventually reduce the waste in the process that eventually benefit the environment. It is possible that NME's knowledge influenced their perception to "agree" that waste is separated at the source. In 2019, an internal waste compliance audit report indicated that cross contamination of waste was noted in certain parts of the port. Jovanovic and Živković (2020) stated that the inappropriate disposal of waste in locations that are not designed for such purposes can be problematic. The Port of Cape Town were found to be non-compliant to the Waste Act (No. 58 of 2008) in certain parts of the port, while in other parts good practices of waste separation was observed, and those parts of the port were found to be compliant (TNPA, 2019d).

7.2.2.3 Transnet

The ME's and NME's chose the options of "strongly agree" (15.9 % and 16.2 %, respectively) and "agree" (29.5 and 37.1 %, respectively) for the statement: "There is separation of waste at the source". 22.7 % of the ME's and 24.7 % of the NME's chose the option of "unsure". Other ME's and NME's chose the options of "disagree" (25.0 % and 14.8 %, respectively) and "strongly disagree" (6.8 % and 7.2 %, respectively) (Figure 7.2.2).

Most of the ME's and NME's chose the "agree" option and thus feel that waste is separated at the source. The National Waste Management Strategy (NWMS) advocates for waste to be separated at the source by all sectors (DEA, 2011). In heading 5.2.7.3 (Transnet) it was revealed that ME's and NME's are informed of relevant environmental legislation. Knowledge of the environmental legislation by ME's and NME's might have influenced their perception regarding separation of waste at the source. The TNPA has placed a contract that collects different types of waste in

the Port of Cape Town for a period of three years, where this waste contract includes the collection of different types of waste. This requires the separation of waste before collection (TNPA, 2017a; 2017b). The TNPA promotes the separation of waste at the source in its strategy (TNPA, 2015a, b & f; TNPA, 2020a). This possibly contributed to the positive perception of MEs and NME's regarding separation of waste at the source.

As much as there were ME's and NME's that "agreed" that separation of waste is happening at the source, others chose the options of "disagree" (25.0 % and 14.8 %, respectively) and "strongly disagree" (6.8 % and 7.2 %, respectively) (Figure 7.2.2). The TNPA (2019a) internal audit regarding compliance as it relates to the Waste Act revealed that some of the operational areas within the port were separating waste, while in other areas it did not happen. This is in line with the results of the present study shown in Figure 7.2.2. Although most of the respondents chose the "agree" option, quite a few of the ME and NME respondents "disagreed" that separation of waste is happening. The differences in the perception of respondents on separation of waste at the source is thus in line with the findings of the TNPA (2019a) audit report. Separation of waste at the source in the Port of Cape Town seems to be implemented partially, and not throughout the entire port. Among others, cross contamination of waste, lack of knowledge, unlabelled reception facilities were identified as a root cause. In the investigation, which was conducted by the TNPA team in 2008, it was discovered that there was no separation of waste on site (TNPA, 2008). Although this report indicate alignment with the perception of ME's and NME's that "disagreed" with the statement that there is separation of waste at the source, there has been improvement observed (CEFAS, 2020). It should be indicated that there has been progress since 2008 in this regard since there seem to evidence that separation of waste is happening to a certain degree and/or at certain areas in the port.

22.7 % of the ME's and 24.7 % of the NME's chose the option of "unsure". This group may possibly not be directly involved in waste related matters of the port. This is despite the TNPA promoting the separation of waste at the source in its strategy (TNPA, 2015a, b & f & 2020a). The strategy is supposed to be known by everyone in the organisation regardless of the function or responsibility. The relatively high level of

“unsure” responses could thus be indicative of ignorance of the ME’s and NME’s regarding waste separation.

7.2.2.4 WLPH’s

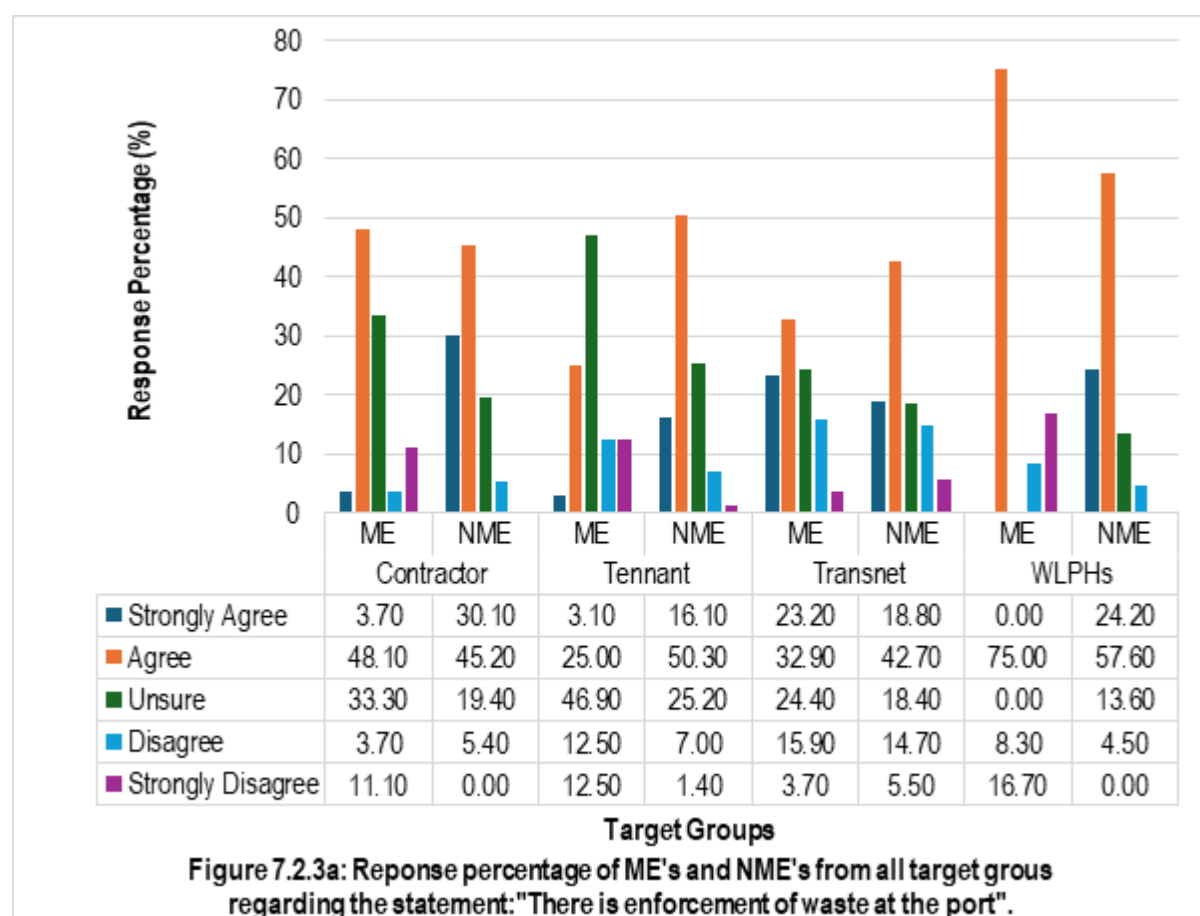
Only NME’s chose the option of “strongly agree” (30.3 %). Most of the ME’s and NME’s chose the “agree” option (40.0 % and 36.4 %, respectively). ME’s and NME’s (30.0 % and 24.2 %, respectively) also chose the “unsure” option. Other ME’s and NME’s chose the options of “disagree” (10.0 % and 9.1 %, respectively) and “strongly disagree” (20.0 % and 0 %, respectively) to a lesser degree (Figure 7.2.2).

The majority of the ME’s and NME’s agree that there is indeed separation of waste at the source. The government of South Africa promote the separation of waste at source to be implemented by both industries and the society (DEA, 2011). According to Metonwaho (2018), the Port of Cotonou in the Republic of Benin is regarded as one of the clean ports with sufficient reception facilities to separate waste and dedicated employees to execute their duties. In heading 7.2.1.4 (*Waste Licence Permit Holders*) on the issue of whether *the port is clean*, WLPH’s indicated that certain ME’s and NME’s are directly involved in port activities that relate to the collection of waste. In heading 5.2.1.4 the WLPH’s indicated that they are responsible for the supply of the waste reception facilities. The ME’s are directly involved in receiving calls for the collection of waste will enquire about the type of waste, waste bin type and size that needs to be collected. The NME’s that are directly involved in port services will be directed accordingly for such collection and will dispose the waste to an appropriate landfill site. The direct involvement of WLPH ME’s and NME’s possibly influenced their perception of whether waste is separated at the source. Furthermore, in heading 2.9.4 (*Waste licence permit holders sampling procedure*), it is indicated that waste is the core business of the WLPH’s. During the annual audits conducted by the TNPA ES, it was observed that waste is separated as part of their processes (TNPA, 2017c). In heading 5.2.7.4 (*WLPHs*) on “knowledge” revealed that they are informed of the legislation. The legislation might possibly have influenced their perception and personal experience at work environment for separation of waste at the source.

In general, most of the ME’s and NME’s agreed that waste is separated in the port, although some disagreed and others were even unsure. There were cases where the

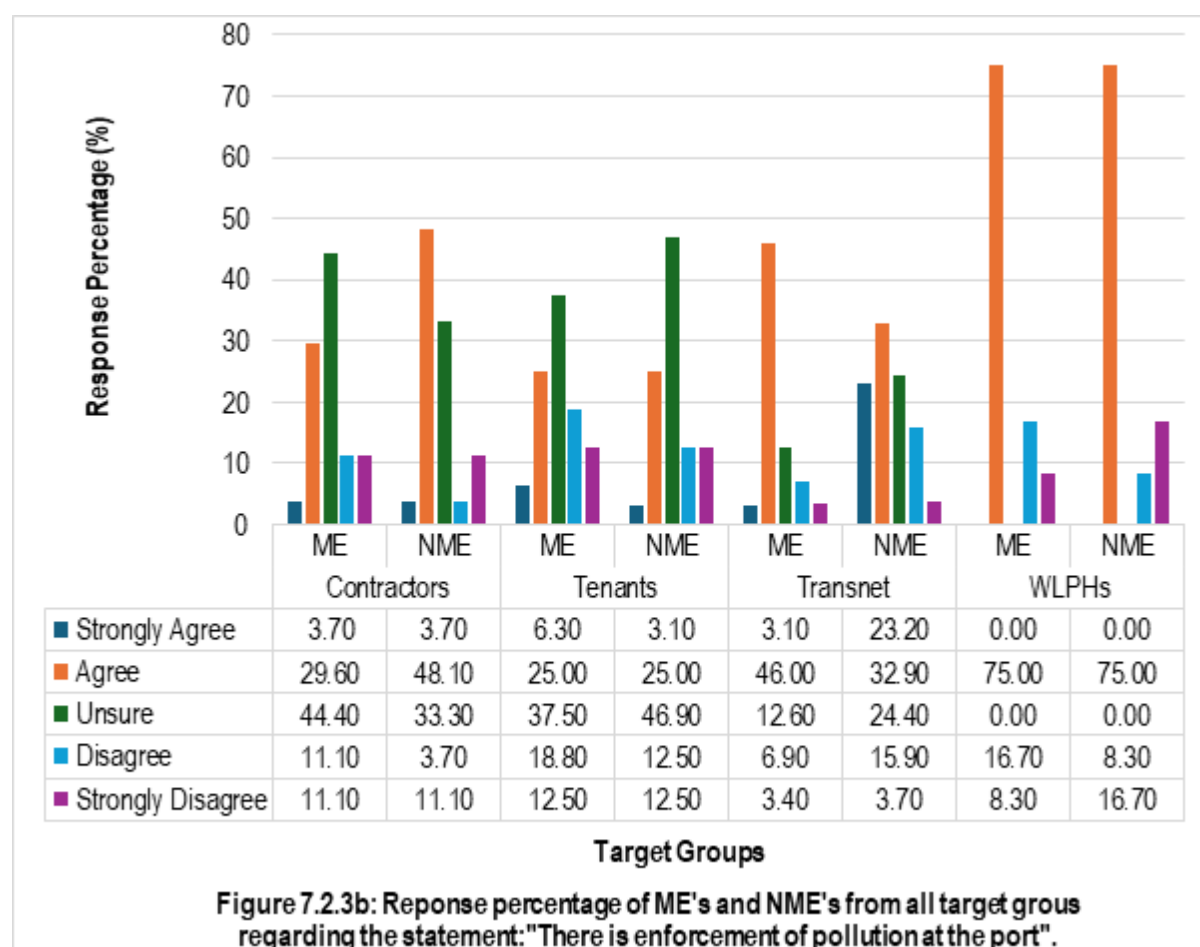
WLPH's at the Port of Cape Town complained that waste is mixed in the waste reception facilities. In the correspondence of TNPA and WLPH's it was clear that there are such cases where waste is not separated (Appendix F5). In the meeting minutes of the 22 July 2008, in the Port of Cape Town a complaint was recorded that indicated that on the quay sites of the Port of Cape Town there were no proper separation of waste, which made it difficult for the service provider to remove the mixed waste (TNPA, 2008; Appendix F6). This could be a contributing factor that led to some ME's and NME's with the perception that waste is not separated at the source. However, it should be noted, other reports indicated that there has been progress since 2008 in this regard since there seem to evidence that separation of waste is happening to a certain degree and/or at certain areas in the port (CEFAS, 2020; GES, 2014). Banerjee (1971) argued that the individual's knowledge of the environment has to do with what is in his/her mind that is based on the experience related to such a place. Certain ME's and NME's chose the "unsure" option. This may seem like a strange response coming from WLPH's. However, this could be due to certain MEs and NME's that may not be directly involved in the waste services in the port.

7.2.3a Responses of ME's and NME's of all target groups regarding the statement: "There is enforcement of waste at the port"



There were no statistically significant differences between the ME's and NME's of all the target groups with regards to the statement: "There is enforcement of waste at the port" ($P > 0.05$) (Figure 7.2.3a).

7.2.3b Responses of ME's and NME's of all target groups regarding the statement: "There is enforcement of pollution at the port"



There were no statistically significant differences between the ME's and NME's of all the target groups with regards to the statement: "There is enforcement of pollution at the port" ($P > 0.05$) (Figure 7.2.3b).

7.2.3.1 Contractors

The ME's and NME's chose the options of "strongly agree" (3.7 % and 30.1 %, respectively) and "agree" (48.1 and 45.2 %, respectively) for the statement: "There is enforcement of waste at the port" (Figure 7.2.3a). 33.3 % of ME's and 19.4 % of NME's chose the option of "unsure". The ME's and NME's chose the options of "disagree" (3.7 % and 5.4 %, respectively) and "strongly disagree" (11.1 % and 0 %, respectively) to a lesser degree (Figure 7.2.3a).

The ME's and NME's chose the options of "strongly agree" (3.7 % and 3.7 %, respectively) and "agree" (29.6 and 48.1 %, respectively) for the statement: "There is enforcement of pollution" (Figure 7.2.3b). 44.3 % of ME's and 33.3 % of NME's chose the option of "unsure". The ME's and NME's chose the options of "disagree" (10.1 % and 3.7 %, respectively) and "strongly disagree" (11.1 % and 11.1 %, respectively) to a lesser degree (Figure 7.2.3b).

Most of the ME's and NME's agreed that there is enforcement of waste and pollution in the port of Cape Town (Figure 7.2.3a & b). In heading 4.2.1 (*Contractor responses (ME's and NME's) concerning environmental training programmes*) it was indicated that there are random inspections by the DoL in addition to the TNPA process). Also, in headings 3.2.3.2 and 4.2.1.2 on pollution and water related awareness and training, respectively, it was shown that before the flooding and unflooding takes place in conjunction with docking and undocking processes, a compliance process takes place to avoid pollution and contamination of water in the dry docks. Certain ME's and NME's, due to their roles and responsibilities, are involved during this process. Additionally, the TNPA's Risk Specialist (RS) has the right to stop any work that threatens safety, health and the environment on-site. Due to the training programmes on environmental issues received by the NME's and ME's, and the random inspections by the DoL and the RS of TNPA, waste and pollution issues may have been sufficiently emphasised for the purposes of contractor operational activities. Furthermore, environmental monitoring, compliance and enforcement is conducted by the Environmental Management Inspectors from DFFE throughout the South African ports system. Notices, fines and penalties are also issued for contraventions of environmental laws (DEA, 2013/4; DFFE, 2019/20). The ME's and NME's responsible for the site cleanliness work together to enforce waste related compliance in the port. Inspections are done by an NME and signed off by a ME in charge. The waste issues are discussed at green area meetings for employees to be aware of the actions that needs to be implemented. On a daily basis, the ME's and/or supervisors will conduct short briefing meetings before operations commence. The purpose, amongst others, is to raise awareness about particular SHE matters, such as waste and pollution concerns. These meetings are called green area meetings. In that way the awareness and enforcement of waste issues on-site may have positively influenced responses of the ME's and NME's. Sudarmadi *et al.* (2001) argued that the more people are being

made aware and more knowledgeable on environmental issues the better the perception. In the study conducted in Spain by López-Gamero *et al.* (2010) to managerial employees (ME's), the results indicated that when environmental legislation is not voluntarily but as a command its influence was not significant. However, when the MEs decided to adhere to environmental legislation voluntarily, the effects were found to be positive. The Port of Cape Town was given a warning for waste and pollution in their operations in the dry docks that has a potential to compromise the environment (DEFF, 2019). This type of experience by the ME's and NME's is evidence that enforcement of waste and pollution matters in the port is happening. Those ME's and NME's are thus perceiving enforcement of pollution matters as something that is taking place in the port.

Generally, most of the ME's and NME's chose "unsure" on the issue of waste and pollution enforcement matters (Figure 7.2.3a & b). As indicated earlier contractors receive environmental training [heading 4.2.1 (*Contractor responses (ME's and NME's) concerning environmental training programmes*)] during the induction process. It is stipulated in that chapter that there are random inspections conducted by the DoL and the RS of the TNPA concerning the operational activities of the contractors. Furthermore, in heading 3.2.3.2 and 4.2.1.2 (*Pollution and water related awareness and training for contractors*) it was stipulated that in the dry docks there are procedures that must be complied with before the flooding and unflooding takes place. This is done in conjunction with the docking and undocking process of a vessel to ensure that enforcement of the procedures for "pollution" and "water" related matters is adhered to so that the environment is not compromised. This process does not necessarily involve all the contractor ME's and NME's but only those directly involved in these matters. The rest of the ME's and NME's of the contractors normally become involved at the later stage during operational activities. After the completion of the operational activities, again not all ME's and NME's are involved onsite for the flooding and unflooding of the dry docks. All this may have contributed to the high level of "unsure" responses from ME's and NME's. Thomashausen *et al.*, (2018) and Zhakata *et al.* (2016) argued that South Africa is one of the developed countries in Africa. However, lack of enforcement is one among the chief reason for poor waste and pollution management. One of the challenges that faces South Africa in managing waste is a lack of enforcement and effective monitoring because of a shortage of suitably trained

experts in the field of waste management (Mannie, undated). Cooperation is required from all sectors in order to overcome this challenge. It is possible that the environmental awareness and training was indeed received by the contractor ME's and NME's but that they may not have received any random inspections from the DoL and the RS of the TNPA before they leave the Transnet premises when their contracted work was completed. The issue with contractors is that their work contract is often relatively short, so they may not experience the full extent of the enforcement measures. This may have also contributed to the uncertainty from certain respondents regarding enforcement of waste and pollution matters in the port.

7.2.3.2 Tenants

The ME's and NME's chose the options of "strongly agree" (3.1 % and 16.1 %, respectively) and "agree" (25.0% and 50.3 %, respectively) to a certain degree for the statement: "There is enforcement of waste". 46.9 % of ME's and 25.2 % of NME's chose the option of "unsure". Generally, less of the ME's and NME's chose the options of "disagree" (12.5 and 7.0 %, respectively) and "strongly disagree" (12.5 % and 1.4 %, respectively) (Figure 7.2.3a).

The ME's and NME's chose the options of "strongly agree" (6.3 % and 3.1 %, respectively) and "agree" (25.0% and 25.0 %, respectively) to a certain degree for the statement: "There is enforcement of pollution". 37.5 % of ME's and 46.9 % of NME's chose the option of "unsure". To a certain degree less of the ME's and NME's chose the options of "disagree" (18.8 and 12.5 %, respectively) and "strongly disagree" (12.5 % and 12.5 %, respectively) (Figure 7.2.3b).

Quite a few of ME's and NME's felt that waste related matters are enforced (Figure 7.2.3a). There are certain operational activities that the tenants perform that can only be done in the dry docks, such as vessel cutting (TNPA, 2018c). Due to these tenants' operational activities in the dry docks, they must comply to the requirements of submitting a SHEP file to the TNPA's SHE department. It is the responsibility of the Risk Specialist to review and approve compliant files before the commencement of work on-site (Transnet SOC Ltd, 2017a). Most organisations strive to comply with legal requirements to reduce accidents and negative environmental impacts in the workplace (Velasquez *et al.*, 2018; Çalış & Büyükkıncı, 2019; Asah-Kissiedu *et al.*,

2021). To this end tenants must attend the induction training programme as required for contractors working in the dry docks (see heading 4.2.1 *Contractor responses (ME's and NME's) concerning environmental training programmes*). With big tenant companies they can, in some cases, split their ME's and NME's into different groups based on the scope of work to be done in the dry docks as well as in their leased space in the port. They are most likely to have similar experiences in the dry docks as contractors. In heading 4.2.2.1 (*Waste and oil spill related training*) it is confirmed that certain activities of contractors and tenants are similar. Before and/or after the conclusion of operations, the TNPA dock master and a supervisor (or project manager and selected NME's) from the tenants or the contractors, who is responsible for particular operations or projects in the dry docks, conduct pre and exit inspections to check for compliance (ILO, 2008; TPT, 2012; Gong *et al.*, 2019).

As indicated in heading 7.2.1.1 (*Contractors*) the DoL and the RS of the TNPA conduct random inspections in the port. It is thus possible that the majority of the tenant NME's experienced the inspections at least once, including a few of the ME's at the operational sites in the port. It is thus possible that NME's and ME's perception that there is enforcement of waste matters in the port was influenced by the training they received as well as the inspections conducted by the DoL and RS of the TNPA. Furthermore, in heading 4.2.2.1 (*Waste and oil spill related training*) it is indicated that the ES of the TNPA conducts oversight audits in tenant premises for enforcement of environmental regulations and laws, including those related to waste. These audits conducted by the ES of the TNPA could also have influenced the ME's and NME's perception with regards to waste enforcement at the port.

Most of the ME's and the second most of the NME's were "unsure" that enforcement of waste matters take place in the port (Figure 7.2.3a). These groups may have received training on waste matters as indicated in heading 4.2.2.1 (*Waste and oil spill related training*), as well as the necessary inductions. However, they may not have experienced any inspection visit from the DoL or the RS of the TNPA during their operational activities. The National Ports Act No. 12 of 2005 in Section 11 states that the TNPA has the power to enforce environmental laws for the protection of the port environment. In the knowledge chapter in heading 5.2.7.2 (*Tenants*), in conjunction with figure 5.2.7 it is indicated that the ME's and NME's are informed of relevant

environmental legislation. Furthermore, it was indicated in heading 4.2.2 (*Tenant responses (ME's and NME's) concerning environmental training programmes*) that there are only two ES's appointed for the Port of Cape Town. Only one of them is conducting oversight audits with the tenants. It should be noted that the port has 120 tenants, and the ES is able to conduct audits with only 15 tenants per year. This means that the majority of the ME's and NME's were trained on waste related matter, attended inductions, have knowledge of the environmental legislation and Transnet rules, and are aware of the oversight audits. However, many of them may not have experienced these audits conducted by the ES as yet, due to human resource limitations. This situation may have contributed to the uncertainty of many ME's and NME's with regards to the enforcement of waste matters in the port.

A few of the ME's and NME's disagreed that enforcement of waste matters is taking place. This disagreement could be due to the same reasons as indicated for the "unsure" responses. However, this group that disagrees feels more strongly about the lack of audits and enforcement taking place. Environmental challenges can only be resolved if law enforcement measures are taken (Listiyani & Said 2018; Gupta *et al.*, 2019). In a study conducted in Serbia, it was found that there are many factors that contribute to inadequate waste management from industrial and other activities, communal and service actions, which create security challenges and a threat at the local level. Also, a lack of human resources to execute the work is one of the common challenges (Jovanovic and Živković, 2020).

Most of the ME's and NME's of tenants were "unsure" with regards to the enforcement of pollution matters in the port (Figures 7.2.3b). Although they may have been trained on environmental issues, have attended awareness sessions regarding pollution matters, and have the required knowledge of relevant environmental legislation, as indicated above, these tenants do not always experience enforcement of pollution matters through internal TNPA audits in the port due to the lack of human resources. One of the challenges that South Africa faces in managing the environment is a lack of enforcement and effective monitoring because of a shortage of suitably trained experts in the field of pollution-related management (Davids, 2020). To resolve environmental waste and pollution problems law enforcement measures must be taken (George *et al.*, 2020; Listiyani and Said, 2018). It is possible that the lack of

human resources at TNPA to enforce pollution matters contributed to the uncertain perception from respondents.

Quite a few of ME's and NME's agreed with the statement: "There is enforcement of pollution" (Figure 7.2.3b). Some of the duties of tenants are performed in the dry docks depending on the operational requirements. They also have to submit a SHEP file for work done in the dry docks as indicated in heading 4.2.1 (*Contractor responses ME's and NME's concerning environmental training programmes*). The SHEP file must be reviewed and approved by Risk Specialist (RS) of TNPA (Transnet SOC Ltd, 2017a). When tenants do work in the port outside of their workshops, they often must split their workforce into two groups. In recent times most organisations that prioritise safety, health and environmental management, strive to comply with legal requirements, in order to reduce accidents and negative environmental impacts (Velasquez *et al.*, 2018; Çalış & Büyükkancı, 2019; Asah-Kissiedu *et al.*, 2021). Therefore, the work done by tenants can sometimes be similar to the contractors in the dry docks as also indicated in heading 4.2.2.2 (*Pollution and water related training*). As indicated in heading 7.2.1.1 (*Contractors*) the DoL and the RS of the TNPA conduct random inspections in the port. It is possible that these groups of the tenants experienced these inspections. After the conclusion of operations, the TNPA dock master, who is responsible for the dry docks, goes for a final inspection to check for compliance together with tenant ME's and selected NME's (ILO, 2008; Transnet Port Terminal, 2012; Gong *et al.*, 2019). It is thus possible that the tenant NME's and ME's perception that enforcement of pollution matters is taking place is due to the inspections of the DoL, the RS and the dock master of the TNPA. Furthermore, in heading 4.2.2.2 (*Pollution and water related training*) it is indicated that the ES of the TNPA conducts oversight audits on tenant premises to ensure compliance and enforcement of environmental regulations and laws. This audit conducted by the ES could also have positively influenced the ME's and NME's perception.

7.2.3.3 Transnet

The ME's and NME's mostly chose the options of "strongly agree" (23.2 % and 18.8 %, respectively) and "agree" (32.9 and 42.7 %, respectively) for the statement: "There is enforcement of waste". 24.4 % of ME's and 18.4 % of NME's chose the option of "unsure". The ME's and NME's chose the options of "disagree" (15.9 and 14.7 %, respectively).

respectively) and “strongly disagree” (3.7 % and 5.5 %, respectively) to a lesser extent (Figure 7.2.3a).

The ME’s and NME’s mostly chose the options of “strongly agree” (31.0 % and 23.2 %, respectively) and “agree” (46.0 and 32.9 %, respectively) for the statement: “There is enforcement of pollution”. 12.6 % of ME’s and 24.4 % of NME’s chose the option of “unsure”. The ME’s and NME’s chose the options of “disagree” (6.9 and 15.9 %, respectively) and “strongly disagree” (3.4 % and 3.7 %, respectively) to a lesser extent (Figure 7.2.3b).

In general, ME’s and NME’s had the perception that waste related issues are enforced in the port (Figure 7.2.3a). The strict enforcement of municipal by-laws is necessary for efficient waste and pollution management. Failure to enforce will undermine the efficiency of waste and other related environmental management issues (Berglund, 2006; Snyman and Vorster, 2011; Worku and Muchie, 2012). DEFF, SAPS, provincial departments, municipalities and Transnet have been collaborating on joint operations for enforcement of waste and other related environmental issues in the Port of Cape Town (DFFE, 2018; Marie - Louise Lume, pers com 2018). It should be noted that these joint operations take place only now and then and randomly in the Port of Cape Town to enforce waste and other environmental issues. Liu *et al.* (2021) stated that participation of the public in the enforcement of local government environmental regulations has a positive effect, as it improves environmental governance, implementation and improves the perception of enforcement matters. It is possible that these joint operations influenced the Transnet ME’s and NME’s perception in a positive way in relation to the enforcement of waste in the Port of Cape Town.

Some of the ME’s and NME’s disagreed and negative that enforcement of waste and pollution matters are taking place, while some others were even uncertain (Figure 7.2.3a & b). The Pollution Control Officer (PCO) of the Port of Cape Town is meant to be responsible for the monitoring and control responses on issues of waste and pollution in the water and on land. The PCO is meant to establish and maintain, as far as possible, a waste and pollution free environment within the working port by means of active participation with and monitoring, policing, and education of all port users. Also, to form part of the SHEQ internal inspection team within the port (TNPA, 2010a,

Appendix F7). However, the PCO position has been vacant for several years now and this position's responsibilities have been split between other TNPA staff members. For several years, Transnet embarked on moratorium to curb the costs in the organisation. Among other control measures that were implemented was (i) immediate moratorium on recruitment of staff and support functions, (ii) critical vacancies to be approved by Group Chief Executive Officer, (iii) any recruitment underway were put on hold, (iv) and all positions on moratorium (Transnet SOC Ltd, 2015b). The enforcement and finances complement each other especially in implementing environmental regulations. The lack of finances can compromise the enforcement of environmental regulations (Cansio *et al.* 2021; Galeotti, 2020). However, this situation has resulted in inefficiencies in terms of the PCO functions (TNPA, 2020). During this study no legislation could be found that gives TNPA, as the landlord, specific powers to issue fines related to waste and pollution matters; this includes the National Ports Act (No. 12 of 2005), although Section 11 requires the port to enforce environmental laws in order to protect the environment. These also include other unpromulgated environmental legislation related to ports (DoT, 2017; GEF-UNDP-IMO, 2009). In the interview with local government especially the Environmental Resources of the city of Cape Town stated that “...*Enforcement outside the port...*”. This would mean that they do not get involved in enforcement in the port. Furthermore, it may be that certain Transnet employees responded in a negative or uncertain way due to them knowing about the void left by the vacant PCO position. The compliance internal audit report of TNPA done in 2019, as it relates to the Waste Act, showed that within the port operational areas some areas were separating waste, while did not (TNPA, 2019d). This result corresponded with the present study as shown in Figure 7.2.2 of heading 7.2.2.3 (*Transnet*) that indicates that separation of waste at the source was partially practiced in the Port of Cape Town. Kim & Kang (2019) argued that the leftover pollution or structures from the past operational activities in the industry or commercial areas create a certain type of perception in people's minds. In 2020 the Department of Forestry Fisheries and Environment (DFFE) visited the Port of Cape Town and identified the Elliot Basin as a “dirty” site. The site was found with waste reception facilities overflowing. It is clear evidence that some parts of the port are not in an acceptable state (DEFF, 2020b).

Furthermore, the Port of Cape Town was given a notice of intent for environmental pollution in their operations in the dry docks that has a potential to compromise the environment (DEFF, 2019). Yoon and Heshmati (2017) argued that even if there are best environmental regulation in place, as long as there are no investment in enforcement, the expected results will more often be uncertain and with more challenges. The Port has pollution control vessel designed to collect debris. Since its now old it is no longer effective and quick in marine clean-up operations. Due to its age more often, it encounters breakdown. During the breakdown for repairs the port experience a challenge of unsightly pollution on water (TNPA, 2021). This result corresponds with the current study. In heading 7.2.4.3 *Transnet*, in a statement that “pollution management is a problem in the port of Cape Town”, the ME’s and NME’s response perception “agreed” (Figure 7.2.4b). These could be possibly have influenced the ME’s and NME’s perception to be “unsure” and “disagree” of the enforcement of pollution in the Port of Cape Town. These negative findings from past reports may have influenced the ME’s and NME’s perception negatively which results in them choosing “unsure” and “disagree” in their responses concerning the enforcement of waste matters in the Port of Cape Town.

The ME’s and NME’s mostly agreed that pollution matters are enforced in the port (Figure 7.2.3b). Random inspections are conducted through joint operation activities in the Port of Cape Town. These inspections look at monitoring and enforcement of pollution related matters to the port users. The authorities involved on these collaborations include DEFF, SAPS, DEADP, the local municipality and Transnet (DFFE, 2018; Marie - Louise Lume, pers com 2018). Lam and Notteboom (2014) indicated that leading ports of Europe and Asia, namely Antwerp, Rotterdam, Singapore, and Shanghai adhered to environmental standards and regulations. A contributing factor was enforcement of relevant legislation and regulations. It is possible that the joint inspections at the Port of Cape Town had a positive influence on the Transnet ME’s and NME’s perception in relation to the enforcement of pollution and other environmental related issues.

7.2.3.4 WLPH’s

The NME’s chose the option of “strongly agree” (24.2 %), while most of the ME’s and NME’s chose “agree” (75.0 and 57.6 %, respectively) for the statement: “There is

enforcement of waste". None of the ME's and 13.6 % of the NME's chose the option of "unsure". The ME's and NME's chose the options of "disagree" (8.3 and 4.5 %, respectively) and "strongly disagree" (16.7 % and 0 %, respectively) to a lesser extent (Figure 7.2.3a).

The ME's and NME's mostly chose the option of "agree" (75.0 and 75.0 %, respectively) for the statement: "There is enforcement of pollution". None of the ME's or NME's chose the options of "strongly agree" or "unsure". The ME's and NME's chose the options of "disagree" (16.7 and 8.3 %, respectively) and "strongly disagree" (8.3 % and 16.7 %, respectively) to a lesser extent (Figure 7.2.3b).

Most of the ME's and NME's agreed that there is enforcement of waste related matters in the port (Figure 7.2.3a). Generally, the WLPH's thus held the perception that waste matters are enforced in the Port of Cape Town. Section 56 (2) of the National Ports Act of 2005 (Act No. 12 of 2005) requires any organisation that want to provide services in the waste sector within the port environment to apply for a waste permit with the TNPA. Part of the approval criteria requires "take on audits". Take on audits are an auditing process that is conducted for all first-time applicants applying for waste licence permits (Republic of South Africa, 2005). All legal requirements must be met before a license to operate can be issued. Furthermore, the ES of the TNPA has the right to monitor and enforce environmental related issues of the applicant for a waste licence permit to ensure that their operational activities do not threaten the environment (Republic of South Africa, 2005). In heading 5.2.7.4 (*WLPH's*) and in figure 5.2.7 it was revealed that the WLPH ME's and NME's have knowledge of relevant environmental legislations. Tian *et al.* (2019) stated that the Chinese government started enforcing environmental regulations and implementing inspection systems after realising that rapid growth of industries lead to a deteriorating environment. The command-and-control regulation related to enforcement was found to be playing a vital role in reducing environmental pollution (Xie *et al.*, 2017). It is possible that the knowledge of the waste licence conditions, National Ports Act requirements and audits conducted on the WLPH's operations, influenced the ME's and NME's perception that there is enforcement of waste in the port. Additionally, service level agreements between the TNPA and WLPH's indicate that TNPA will inspect and monitor adherence to environmental requirements. This would have also

contributed to the WLPH's positive perception regarding enforcement of waste issues in the port. DEFF, SAPS, provincial departments, municipalities and Transnet have been collaborating on joint operation activities regarding enforcement of waste and other related environmental issues in the port (DFFE, 2018; Marie-Louise Lume, per coms 2018). These joint operations take place randomly in the Port of Cape Town. It is possible that these joint operations influenced the WLPH ME's and NME's perception in relation to the enforcement of waste in the port.

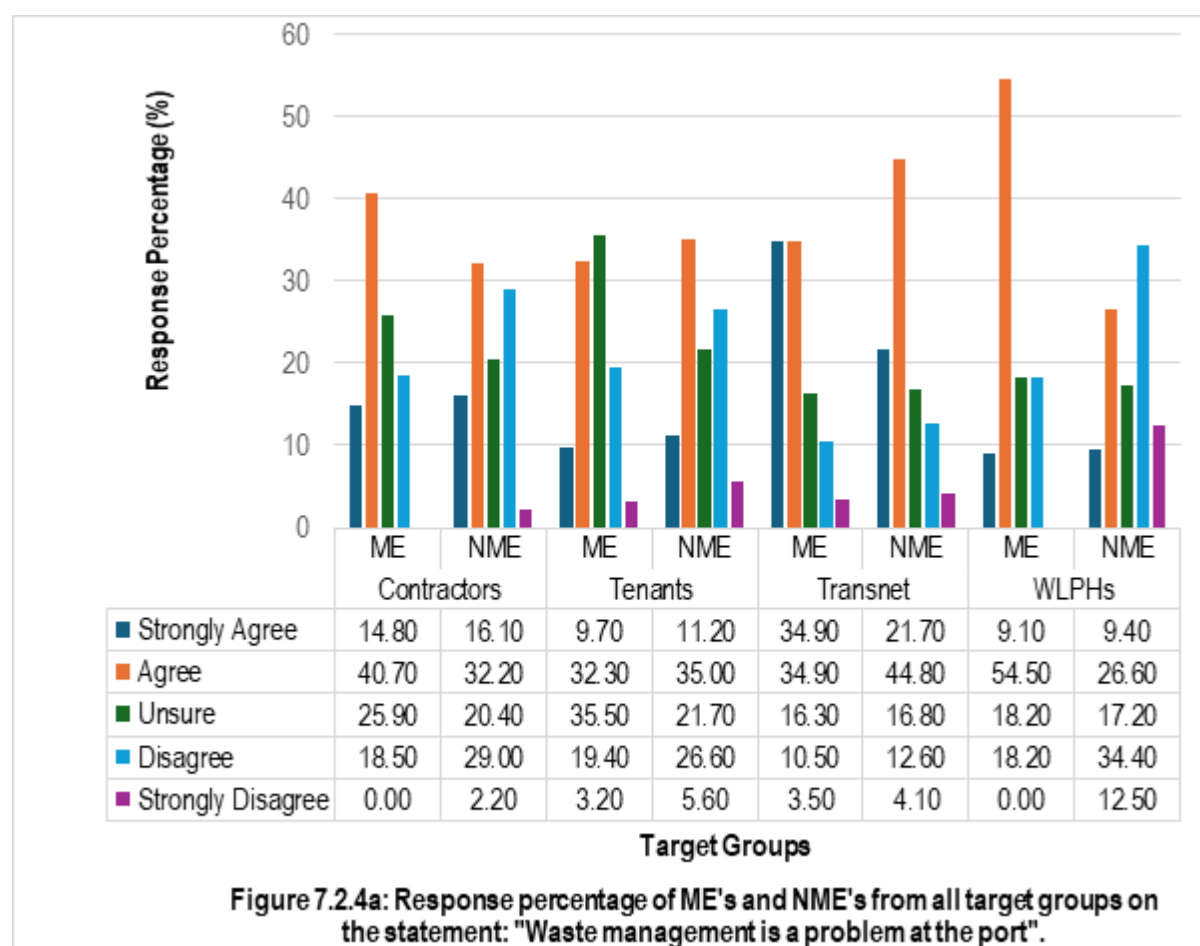
Some of the WLPH ME's and NME's held the perception that waste matters are not enforced in the Port of Cape Town (Figure 7.2.3a). It may be that these ME's and NME's have not experienced the joint inspections team of DEFF, SAPS, the local municipality, and TNPA (DFFE, 2018; Marie-Louise Lume, per coms 2018). This joint operations team does not have their activities regularly (once in a while), hence some WLPH's may not have experienced them at the time of data collection.

The ME's and NME's mostly agreed that there is enforcement of pollution in the port (Figure 7.2.3b). Thus, generally, the WLPH's held the perception that pollution matters are enforced in the Port of Cape Town. The National Ports Act of 2005 (Act No. 12 of 2005), Section 56 (2) requires all service providers intending to remove pollution and waste in the Port of Cape Town to apply for a permit with the TNPA. It is compulsory for "take on audits" to take place as part of the protocol for approval. The "take on audits" are an auditing process that is conducted for all first-time applicant applying for waste license permit (Republic of South Africa, 2005; Department of Transport, 2009). Before the license permit is issued, all the legal requirements must be met. This Act, furthermore, stipulates that the ES of the TNPA has the right to monitor and enforce environmental related issues of the applicant to ensure that the operational activities do not threaten the environment (Republic of South Africa, 2005). In heading 5.2.7.4 (*WLPH's*) and in figure 5.2.7 it is revealed that the ME's and NME's have knowledge of environmental legislations. Additionally, the joint operation team of DEFF, SAPS, the local municipality and the TNPA does occasional random inspections in the Port of Cape Town to check on compliance regarding various environmental issues (DFFE, 2018; Marie-Louise Lume, per coms 2018). The TNPA interdepartmental heads, managers, and supervisors conduct visible field leadership (VFL) for inspections, as well as compliance regarding safety and various environmental issues in the Port of

Cape Town (Bauk, 2016; TNPA, 2022d). Studies have shown that managers can easily influence organisational outcomes (Hambrick & Quigley, 2014; Briscoe *et al.*, 2014). Leadership can affect the organisation's performance and influence how things are done (Hossain *et al.*, 2021; Peterson *et al.*, 2003). Previous internal reports have found that it is necessary for the TNPA to improve interdepartmental communication for effective pollution management in the port (Transnet SOC Ltd, 2015a; TNPA, 2018f; TNPA, 2022e). Together the intergovernmental departments and non-governmental organisations play important role especially in working together for environmental enforcement. An improvement in adhering to environmental regulations has been observed with this type of cooperation (Wyatt, 2013; White, 2012). It is possible that the knowledge of the licence permit conditions, National Ports Act requirements, audits conducted on WLPH's operations, as well as joint operation inspections, influenced the ME's and NME's perception positively that there is enforcement of pollution related matters in the port.

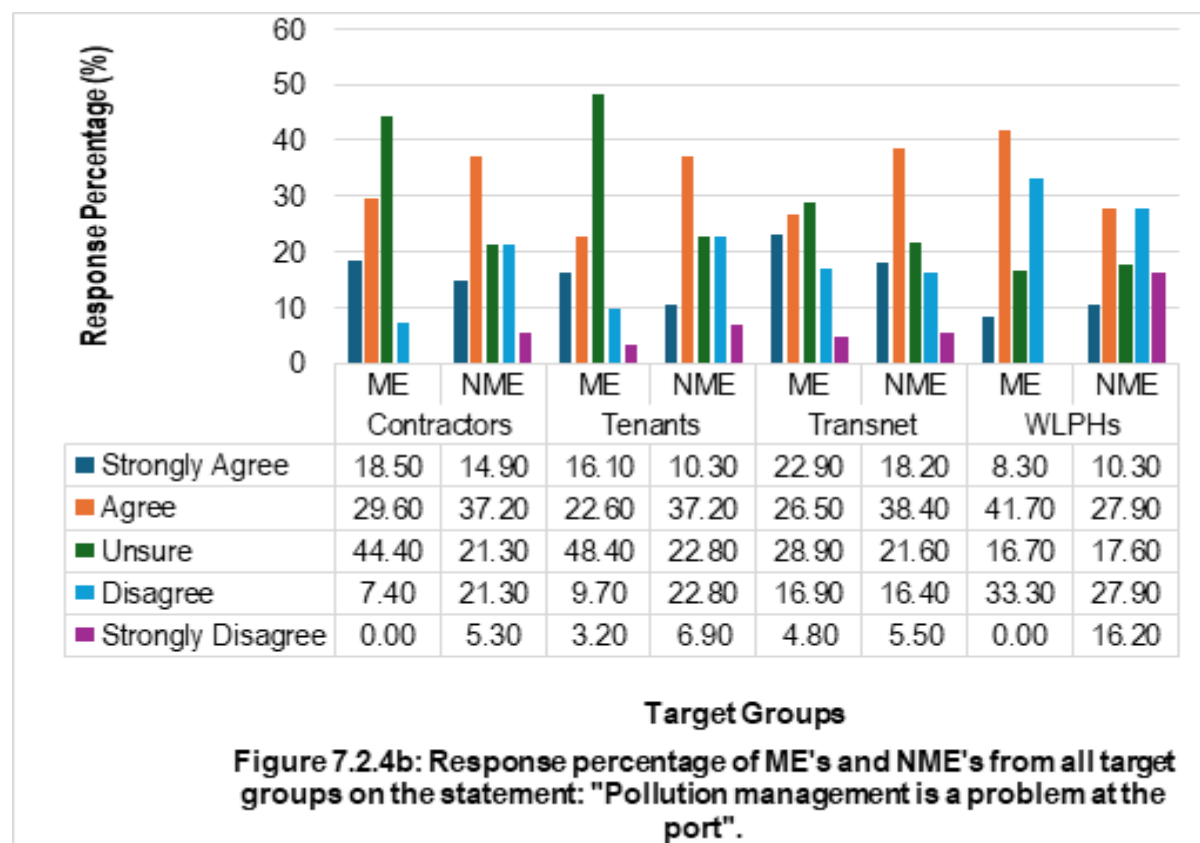
Fewer of the WLPH respondents held the perception that pollution matters are not enforced in the port (Figure 7.2.3b). These ME's and NME's may not have experienced the occasional random inspections of the joint operations team of DEFF, SAPS, the municipality and the TNPA. (DFFE, 2018; Marie-Louise Lume, per coms 2018). This might have negatively influenced the perception of certain ME's and NME's of the WLPH's.

7.2.4a Responses of ME's and NME's of all target groups regarding the statement: "Waste management is a problem at the port"



There were no statistically significant differences between the ME's and NME's of all the target groups with regards to the statement: "Waste management is a problem at the port" ($P > 0.05$) (Figure 7.2.4a).

7.2.4b Responses of ME's and NME's of all target groups regarding the statement: "Pollution management is a problem at the port"



There were no statistically significant differences between the ME's and NME's of all the target groups with regards to the statement: "Pollution management is a problem at the port" ($P > 0.05$) (Figure 7.2.4b).

7.2.4.1 Contractors

The ME's and NME's chose the options of "strongly agree" (14.8 % and 16.1%, respectively) and "agree" (40.7 and 32.3%, respectively) for the statement: "Waste management is a problem at the port". Certain other ME's and NME's (25.9 % and 20.4 %, respectively) chose the option of "unsure", while others chose the options of "disagree" (18.5 and 29.0 %, respectively) and "strongly disagree" (0 % and 2.2 %, respectively) (Figure 7.2.4a).

The ME's and NME's chose the options of "strongly agree" (18.5 % and 14.9 %, respectively) and "agree" (29.6 % and 37.2 %, respectively) for the statement: "Pollution management is a problem at the port". Other ME's and NME's (44.4 % and 21.3 % respectively) chose the option of "unsure". Less of the ME's and NME's chose the options of "disagree" (7.4 and 21.3 %, respectively) and "strongly disagree" (0 % and 5.3 %, respectively) (Figure 7.2.4b).

Most of the ME's and NME's agreed that waste and pollution management is a problem at the port (Figure 7.2.4a - b). In heading 3.2.1.1 (*The ME's response in relation to the question: "Think about waste, what comes to mind?"*) it was revealed that the Port of Cape Town environment can be unsightly due to waste and pollution. This can be due to the dry docks grit blasting materials on the floors, overflowing waste reception facilities not collected regularly, illegal dumping in open spaces, and litter that finds its way into the port via storm water drains and the Salt River. The evidence of these challenges is observed in pictures taken from the Port of Cape Town during the time of data collection (TNPA, 2020a; Appendix E2). Dinwoodie *et al.* (2012b) stated that there are a wide range of environmental issues that can affect a port environment in a manner they are managed, such as poor maintenance in dredging (Zuliani *et al.*, 2016; Iglın *et al.*, 2022), contaminated sediment (Mehlhorn *et al.*, 2021), poor water quality (Tham, 2021), high noise level (Kotowska *et al.*, 2018; Čurović *et al.* 2021), soil contamination (Elsawy & Lakhout, 2020), and oil spillages due to accidents (Paulauskienė & Jucikė, 2015). All these environmental issues are relevant to the Port of Cape Town and failure to manage them correctly can contribute to negatively to the port environment and result with a negative perception as was the case in our current study.

Furthermore, an external waste management audit, which was conducted in 2014, revealed that there were certain areas within the Port of Cape Town that require serious attention as far as waste and pollution management is concerned, among others the dry docks (GES, 2014). Additionally, in heading 3.2.3 (*The contractors' responses (ME's and NME's) concerning environmental awareness programmes*) it was shown that the ME's had a higher response than NME's in relation to waste awareness programmes. It is therefore possible that the unsightly port environment with regards to waste, the results of external waste management audits, and waste

awareness programmes influenced the perception of the ME's and NME's with regards to whether waste management is a problem in the port. It may also be possible that the greater awareness of ME's, due to their higher response percentage for waste awareness (see heading 3.2.3) influenced their perception and resulted in their agreement that waste management is a problem in the port. In the study conducted by Meyer (2018) two groups of people had different environmental perceptions. One group which had less knowledge perceived environmental problems as less serious compared to the other group with a high level of knowledge, which perceived environmental problems as more serious. Therefore, the fact that certain respondents perceived waste management as a problem in the port, could be linked to the fact that they were more exposed to waste awareness and training programmes than some other employees (Figure 3.2.3 – 12; Figure 4.2.1 -10; Table 3.2.5 – 6; Table 4.2.1 – 2).

Thus, pollution management is very important. In headings 3.2.2.1 and 3.2.2.2 the ME's and NME's responses in relation to the question, "Think about pollution, what comes to mind", revealed that the ME's and NME's thought of litter, marine waste, air pollution, oil spills, among others, as pollution issues (Tables 3.2.3 & 3.2.4). In headings 5.2.10.2 (*Pollution and water*) & 5.2.10.3 (*Air pollution*) that dealt with the types of environmental problems that may be caused by companies in the port, the ME's and NME's indicated pollution, water and air as pollution (Figure 5.2.10). In a water and sediment quality report by the CSIR (2022) it was indicated that the sampled water and sediment in all the dry docks in the Port of Cape Town had high levels of pollution, which was associated with ship repair operations. Environmental pollution in seaports is the result of ship movements; ports' own activities and land-based activities. It is therefore necessary to have preventative measures in place to manage pollution in the port (Hiranandani, 2014; Balobanov & Shrarlo, 2020; García-Onetti *et al.*, 2021; Garbatov & Georgiev, 2022). The SHE department of the TNPA must inform all port users and educate them on environmental issues that relate to land or sea-based pollution facing the port. Pollution is one of the major environmental challenges that face the Port of Cape Town (Mohee, 2012). Therefore, effective management of pollution is essential in the port. Similar results of high levels of pollution were found in sediment samples which were collected in the Port of Gdańsk and the Port of Gdynia, Polish ports of international significant. The cause of pollution was traced to

be ship-related activities where the majority of employees are active (Filipkowska *et al.*, 2011; Filipkowska & Kowalewska, 2019). In the Port of Cape Town water and sediment quality reports are shared with the relevant stakeholders as part of environmental awareness and training programmes (TCP, 2018; Transnet SOC Ltd, 2019; CSIR, 2022). Di Vaio & Varriale (2018) suggested that it is critical for all the organisations operating within seaports to be provided with training and awareness programmes in the direction of the environment management to influence their practice for the benefit of a better port environment (Di Vaio & Varriale, 2018). The tenants and contractors must demonstrate the best practice on how they will manage and minimise pollution in their operational activities (Republic of South Africa, 2005). In heading 4.2.1.2 (*Pollution and water related training*), it was mentioned that water and sediments quality reports are shared with the contractors in different platforms and as a part of environmental training programmes, although implementation of the recommendation not fully adhered to. In the same heading and heading 4.2.1.3 (*Air pollution related training*) it is indicated that contractor employees received training programmes in pollution, water and air pollution (Tables 4.2.1-& 2). Research suggests that the more individuals are familiar with the cause of environmental problem the more they are inclined to relate and initiate an action to try to solve the problem with the knowledge they have (Hungerford & Volk, 1990; Kollmiss & Agyeman, 2002). It is thus possible that knowledge of type of environmental pollution, shared water quality reports without fully implementing the recommendations, training received were contributing factors that influenced the ME's and NME's perception that pollution in the Port of Cape Town is a problem. It can therefore be concluded that waste and pollution management in the port of Cape Town it's a problem hence negative response of the ME's and NME's.

Much less of the ME's and NME's held the perception that waste and pollution management is not a problem in the port (Figure 7.2.4a - b). This is an indication that waste and pollution management seem not to be problematic, even if it is only a perception. In heading 7.2.1.1 (*Contractors*) it was indicated that one of the control management measures that influenced the ME's and NME's perception on whether the port is clean was the SHE inspections, that is carried out weekly. The findings of the SHE inspections would be discussed with the rest of the ME's and NME's in the green area meeting to be aware and for actions to be taken. It is possible that this

group of ME's and NME's that "disagree" that waste is a problem at the port, were those that implemented the actions that emanated from SHE inspections. Their involvement in implementing action plans might have influenced their perception to "disagree" with the statement that waste and pollution management is a problem in the port. Gursoy and Gavcar (2003) argued that involvement plays a vital role in motivating people to engage themselves in certain services. Gudmann Knutsson *et al.* (2021) stated that people are more willing to participate in waste and pollution management when they are made aware of their duties concerning their surrounding environment and the role, they have to play to solve the environmental problems. It could be possible that SHE inspection carried out weekly, green area meetings and action plans implemented by respective individuals assigned to them influenced waste and pollution management in respect to the ME's and NME's positive response.

Most of the MEs and NMEs were "unsure" whether waste and pollution is a problem at the port (Figure 7.2.4a & b). This is a concerning result because it implies a significant level of ignorance amongst the employees about waste and pollution management and whether it is a problem at the port or not. They could be unsure because of waste and pollution management is not in the scope of the own job functions. The fact that the port is regarded as clean by some and not clean by others, could also have contributed to the uncertain responses. Another contributing factor can be that the ME's and NME's were unsure because they do not know (do not have the knowledge) to make an assessment on whether waste management is a problem. In heading 4.2.1.1 (waste and oil spill related training), it was found that some ME's and NME's did not receive waste management training. This may have contributed to this group uncertain perception. Numerous factors such as knowledge and attitude play a role in people's environmental perceptions (Burger *et al.*, 2008). In 2004, Gallagher defined attitude as the "perception of or belief regarding the physical environment, including factors affecting its quality" (Gallagher, 2005). Therefore, depending on environmental factors the individual attitude may be influenced (Pulka *et al.*, 2014). Among other identified challenges of pollution is a lack of awareness, training programmes and commitment (Yang, 2020; Petkou *et al.* 2021; Rhein & Sträter, 2021; Vuong *et al.*, 2021). stated that in order to solve environmental problems, environmental training plays an important role. Failure to provide environmental training creates a lack of environmental knowledge to deal with

environmental problems. Inadequate knowledge has a potential to shape false and even uncertain perceptions (Liu *et al.*, 2015; Daskolia *et al.*, 2006). It could be possible that job functions, lack of training that may resulted to lack of knowledge might have influenced the contractors ME's and NME's perception for the response of "unsure" to the statement that pollution management in the port is a problem.

7.2.4.2 Tenants

The ME's and NME's chose the options of "strongly agree" (9.7 % and 11.1 %, respectively) and "agree" (32.3 % and 35.0 %, respectively) for the statement: "Waste management is a problem at the port". The ME's and NME's (35.5 % and 21.7 % respectively) also chose the option of "unsure", "disagree" (19.4 % and 26.6 %, respectively) and "strongly disagree" (3.2 % and 5.6 %, respectively) (Figure 7.2.4a).

The ME's and NME's chose the options of "strongly agree" (16.1 % and 10.3 %, respectively) and "agree" (22.6 % and 37.2 %, respectively) for the statement: "Pollution management is a problem at the port". ME's and NME's (48.4 % and 22.8 % respectively) also chose the option of "unsure", "disagree" (9.7 % and 22.8 %, respectively) and "strongly disagree" (3.2 % and 6.9 %, respectively) (Figure 7.2.4b).

Most of the ME's and NME's agreed that waste and pollution management are problems at the port. Section 28 of the National Environmental Management Act (No. 107 of 1998) determines that whoever causes pollution or degradation of the environment, must take the reasonable measures to such waste and pollution (Republic of South Africa, 1998a). One of the objectives of the Waste Act (No. 59 of 2008) is to protect the environment by providing reasonable management measures for: "(i) avoiding and minimising the generation of waste; (ii) preventing pollution and ecological degradation; (iii) promoting and ensuring the effective delivery of waste services; (iv) remediating land where contamination presents or may present a significant risk of harm to health or the environment" (Republic of South Africa, 2008a). It is the responsibility of the tenants to demonstrate the best practice on how they will manage such waste and the mechanism to use to dispose of waste at the appropriate landfill site while handling pollution in an appropriate manner. Also, to manage minimisation of pollution in their operational activities (DEA, 2014a, Republic of South Africa, 2005). The environmental management plan of the tenant must demonstrate

how waste for disposal will be minimised and how pollution will be dealt. In certain cases, waste and pollution is handled by the TNPA-contracted WLPH's as a lease agreement service to tenants (TNPA, 2015a; 2020a). In heading 5.2.7.2 (*Tenants*) about the statement: "I am informed of the environmental legislations," it was revealed that ME's and NME's agreed that they were knowledgeable on environmental legislation. In heading 3.2.5 (*The tenants' responses (ME's and NME's) concerning environmental awareness programmes*), it was revealed that the ME's and NME's received waste, oil spill, pollution, and water awareness environmental programmes. These were some of the challenges that are met in the Port of Cape Town. Amongst others, overflowing of waste, oil and chemical spills, mixed waste, float sum in the water, unmanaged grit blast at the dry docks, contaminated soil, illegal dumping in open spaces, dust in the truck staging areas (TNPA, 2015a; 2020a). It could be possible that it is possible that the knowledge of environmental legislation, lease agreement requirements, environmental management plans, awareness programme, unmanaged waste, oil and chemical spills, illegal dumping dust, water pollution might have been the contribution factors in the response perception of the ME's and NME's to "agree" that waste and pollution management in the port is a problem.

Most of the ME's and the 3rd most of the NME's were "unsure" whether waste and pollution management are problems at the port. In heading 5.2.7.2 (*Tenants*) regarding the statement: "I am informed of the environmental legislations", it was revealed that some of the ME's and NME's were not knowledgeable regarding environmental legislation. It was also shown in heading 3.2.5 (*The tenants' responses (ME's and NME's) concerning environmental awareness programmes*) that some of the ME's and NME's did not receive waste, oil spill, pollution and water environmental awareness programmes. This is further supported by the oversight audit reports of 2019 (TNPA, 2019b) and 2018 (TNPA, 2018d) that indicated that not all tenant employees received awareness and training for oil spills, water, pollution and legislation, while others received specific programmes related to their job requirements (TNPA, 2019b; Transnet SOC Ltd, 2018b; TNPA, 2015c; GES, 2014). A lack of awareness programme and commitment were identified among other challenges that worsen pollution challenges (Ulph & Ulph, 2013; Yang, 2020; Jayathilake *et al.*, 2020; Jayasinghe *et al.*, 2021). Furthermore, some of this group might not be directly responsible for waste and pollution as part of their job functions. This might have

resulted to possible ignorance of ME's and NME's as far as waste and pollution problem is concerned in the port. Therefore, it is possible that the ME's and NME's lack of environmental knowledge, awareness and ignorance influenced their uncertain perception with regards to waste and pollution management in the port.

The 3rd most of the ME's and the 2nd most of the NME's disagreed that waste management is a problem at the port. The 4th most of the ME's and the 2nd most of the NME's disagreed that pollution management is problem at the port. These respondents felt that waste and pollution management are not problematic at the Port of Cape Town. When individuals are aware of the risks of environmental problems such as waste and pollution and have relevant environmental knowledge and skills, they take reasonable measures to avoid the risks (Yusuf & Fajri, 2022; Dono *et al.*, 2010; Dobson *et al.*, 2007). When individuals are aware of the risks of environmental problems such as waste and pollution and have relevant environmental knowledge and skills, they take reasonable measures to avoid the risks (Dobson *et al.*, 2007; Dono *et al.*, 2010; Yusuf & Fajri, 2022). In heading 4.2.2.1 (*Waste and oil spill related training*), it was found that tenants more often organise informal in-house waste training programmes for employees. Furthermore, in heading 4.2.2.2 (*Pollution and water related training*) it was mentioned that the tenants make use of so-called tool-box sessions for pollution and water training programmes. Tool-box sessions happen in the morning where ME's and NME's discuss operational activities for that day, including the risks that are associated with those activities. Amongst other matters, mitigation measures for risks are identified. It is possible that these mitigation measures and the implementation thereof result in them holding the perception that waste and pollution management is not a problem in the port. Therefore, this group of ME's and NME's direct involvement through tool-box sessions, training and knowledge might have influenced their perception to "disagree" that waste and pollution is a problem in the port.

7.2.4.3 Transnet

The ME's and NME's mostly chose the options of "strongly agree" (34.9 % and 21.7 %, respectively) and "agree" (34.9 % and 44.8 %, respectively) for the statement: "Waste management is a problem at the port". Other ME's and NME's (16.3 % and

16.8 % respectively) chose the option of “unsure”. The least of the ME’s and NME’s chose the options of “disagree” (10.5 % and 12.6 %, respectively) and “strongly disagree” (3.5 % and 4.1 %, respectively) (Figure 7.2.4a).

The ME’s and NME’s chose the options of “strongly agree” (22.9 % and 18.2 %, respectively) and “agree” (26.5 % and 38.4 %, respectively) for the statement: “Pollution management is a problem at the port”. Other ME’s and NME’s (28.9 % and 21.6 % respectively) chose the option of “unsure”, while others chose the options of “disagree” (16.9 % and 16.4 %, respectively) and “strongly disagree” (4.8 % and 5.5 %, respectively) (Figure 7.2.4b).

For the most part, the ME’s and NME’s “agreed” that waste and pollution management is a problem at the port (Figure 7.2.4a - b). Various environmental policies and procedures exist in the TNPA to manage waste and pollution issues in the port. The SHEQ policy of the TNPA commits that everyone in the organisation should comply with all relevant environmental legislation and regulations (Transnet SOC Ltd, 2017b & 2020). Globally, there are many seaports that continue to review their policies to ensure that waste and pollution is reduced in operational activities and managed appropriately (tools and resources) (Tian & Zhu, 2015; Chen *et al.*, 2016; Na *et al.*, 2017; Misra *et al.*, 2017; Chen, 2018; Puig *et al.*, 2022; Le *et al.*, 2023). The Port of Cape Town has an approved Integrated Waste Management Plan (IWMP) (TNPA, 2015a and 2020a). This plan shows the way the employees of Transnet should manage waste and pollution. There has been a significant number of seaports outside of Europe that started drafting and implementing waste management plans. There are number of seaports that continues to grow in this direction. Some of these ports are in South Africa (Port of Cape Town and Durban), India (Port of Mormugao), British Virgin Islands ports (Cayman Island Ports) and United Arab Emirates (Abu Dhabi Ports) (Van Den Dries, 2022). Anthropogenic activities are the results of many seaports around the world to be faced with challenges of waste and pollution (Langella *et al.*, 2016; Onwuegbuchunam *et al.*, 2017; Yu *et al.*, 2017; Luna *et al.*, 2019; Chen *et al.*, 2022; Hossain *et al.*, 2022; Owusu-Mfum *et al.*, 2023). According to Advantage ACT certain parts of the port environment need more attention from the port authority as far as waste and pollution is concerned. In some open spaces in the port, illegal dumping

continues to take place (Advantage ACT, 2016). The oil spill continues to take place in the Port (GES, 2014). Furthermore, the port waters are continuously covered in litter and flotsam that create a risk to marine life. This condition is further aggravated in the rainy season (winter) with stormwater outlets leading into the port waters (TNPA, 2021; Suksri *et al.*, 2021). In a study that investigated pollution in 26 countries all port authorities agreed that the number one environmental concern was water pollution (Roberts *et al.*, 2023). As it was discussed in 7.2.3.3 (*Transnet*) the Pollution Control Officer (PCO) of the Port of Cape Town is meant to be responsible for the monitoring and control responses on issues of waste and pollution. The PCO is meant to establish and maintain, as far as possible, a waste and pollution free environment within the working port by means of active participation with and monitoring, policing, and education of all port users. Also, to form part of the SHEQ internal inspection team within the port (TNPA, 2010a, Appendix F7). However, the PCO position has been vacant for a few years now and this position's responsibilities have been shared between other suitable TNPA staff members. However, this situation has resulted in inefficiencies in terms of the PCO functions (TNPA, 2010 & 2020a). The local authorities' inspection reports and notices of possible penalties to TNPA illustrates that waste and pollution problem in the port (DFFE, 2020b). It is, therefore, not surprising for the ME's and MNE's with negative perception response in the statement that waste and pollution management it's a problem in the Port of Cape Town.

In the Port of Cape Town there are service providers which deals with matters that are related to waste and pollution. These service providers must have waste and pollution liability insurance in place. Without insurance in place, they are not allowed to render provide any service among other requirements (Horkovich *et al.*, 2012; Transnet SOC Ltd, 2017d; TNPA, 2018f; Dybdahl, 2019; Slivka, 2019; Baleni & Geldenhuys, 2021). In addition to these contracts, the TNPA has a dedicated pollution control team that deals with waste and pollution issues, such as oil spills around the port, either on land or water and also oil spills (TNPA, 2022). Despite pollution related issues such as oil spills among others in the port systems, China has shown tremendous improvement of capabilities in marine pollution for effective prevention and control measures. These measures, among others, include framework, technical specification, policies, environmental legislations, oil spill contingency plans and a spill emergency response team (Li, 2020). Policies, strategies and associated documents of the TNPA are

evidence that pollution issues are taken seriously, at least from a governance point of view. The policies, strategies, pollution management contracts, and the pollution control team could be considered as evidence of mechanisms that exist to address an identified pollution problem in the port. However, internal and external audits, local authorities' inspection reports and notices of possible penalties to TNPA indicate that pollution is a problem in the Port of Cape Town [GES, 2014; Advantage ACT, 2016; Paço & Lavrador, 2017; DFFE, 2020b). According to Advantage ACT certain parts of the port environment needs more attention from the port authority as far as pollution is concerned (Advantage ACT, 2016). Furthermore, the port waters are continuously covered in litter and flotsam that create a risk to marine life. This condition is further aggravated in the rainy season (winter) with stormwater outlets leading into the port waters (TNPA, 2021; Suksri *et al.*, 2021]. In a study that investigated pollution in 26 countries all port authorities agreed that the number one environmental concern was water pollution (Roberts *et al.*, 2023). All these factors could have influenced the perception of ME's and NME's to "agree" with the statement that pollution is a problem in the port.

Less group of ME's and NME's "disagree" that waste and pollution is a problem at the port. In 3.2.6 and 4.2.3 heading (*Transnet National Ports Authority responses (ME's and NME's) concerning environmental awareness and training programmes*) revealed awareness and training offered to ME's and NME's of Transnet as far as waste and pollution is consent. Papadimitriou (2004) suggest that the more individual are exposed to information such has potential to impact positively to their personal efficacy for protecting the environment and the more they will have positive perception about environmental related issues and their risks. The received awareness and training may have contributed to a better understanding by these respondents of waste and pollution issues and a better understanding of how to manage it. Their training knowledge and practice may have contributed to their positive perception of waste and pollution management. Also, waste and pollution management may be better managed in the areas of the port where these respondents work, therefore their positive perception. At each department there is a suitable person appointed to notify the SHEQ department or Pollution control team in the instance where waste is overflowing and float sum must be removed on site (TNPA, 2015a & 2020a). In areas where oil spills and illegal dumping was experienced, the pollution control team will be

assigned to attend to such complains. The TNPA has waste and pollution contract service providers in place which can be called at any time should there be a need (TNPA, 2017a&b). However, environmental issues will not be solved solely by the improvement of people's knowledge, unless the relevant authorities take the appropriate actions to find the solution, create policies, enforce compliance, allocate resources and pay the costs of environmental degradation (Noorhosseini *et al.*, 2017; Wang & Cheng, 2017). The local government interview stated that “...*At a large-scale as the generator of waste, the city also regulates the port with reference to the city integrated waste management By-law 2009, as amended in 2010, 2016....*” furthermore it was indicated by the officials that “...*The engagement is on compliance and to assist where necessary to control environmental disaster...*”. It is evident that people’s perception has potential to be influenced by training, awareness, practice and the role of the local government with regulations for compliance.

Very few of ME’s and NME’s “unsure” that waste and pollution management was a problem at the port. Among the ME’s and NME’s who received the training, not all of them employees of Transnet who received training. In 3.2.6 and 4.2.3 heading (*Transnet National Ports Authority responses (ME’s and NME’s) concerning environmental awareness and training programmes*) revealed that there were few employees that did not receive awareness and training as far as waste and pollution management was concerned (Table 3.2.5-6; Table 4.2.1-2). Furthermore, ME’s and NME’s “unsure” could also be because these respondents’ job responsibilities do not extend to waste and pollution issues to result to possible ignorance. Therefore, the lack of knowledge and ignorance might have been the contributing factors to have influenced the perception of the ME’s and NME’s choice of “unsure that waste and pollution was a problem at the port. Debrah *et al.*, (2021) argued that in most developing countries lack environmental knowledge does contribute to waste and pollution problems. Uhunamure *et al.*, (2021) state that awareness and educational campaigns are a step to change people’s perception.

7.2.4.4 WLPH's

The ME's and NME's chose the options of "strongly agree" (9.1 % and 9.4 %, respectively) and "agree" (54.5 % and 26.6 %, respectively) for the statement: "Waste management is a problem at the port" (Figure 7.2.4a). Other ME's and NME's (18.2 % and 17.2 % respectively) chose the option of "unsure", while others chose the options of "disagree" (18.2 % and 34.4 %, respectively) and "strongly disagree" (0 % and 12.5 %, respectively) (Figure 7.2.4a).

The ME's and NME's chose the options of "strongly agree" (8.3 % and 10.3 %, respectively) and "agree" (41.7 % and 27.9%, respectively) for the statement: "Pollution management is a problem at the port" (Figure 7.2.4b). Other ME's and NME's (16.7 % and 17.6 % respectively) chose the option of "unsure", while others chose the options of "disagree" (33.3 % and 27.9 %, respectively) and "strongly disagree" (0 % and 16.2 %, respectively) (Figure 7.2.4b).

To a large degree the ME's and NME's "agreed" that waste and pollution management is a problem at the port. In 2.9.4 heading (*waste licence permit holders sampling procedure*) indicates WLPH's core business is to deal with waste and pollution related matters. The administration of the contracts between the WLPH's and the clients are the responsibility of the ME's. When services are required, the ME's will be knowledgeable to handle such and what services needs to be rendered where. The ME's would then inform the NME's of the clients to be serviced, so as the port. Transnet have at least five contracts with WLPH's in different streams of the waste and pollution to manage waste and pollution in the port (TNPA, 2017a&b). Environmental perception can be influenced by individual's experience and their responsibility towards the environment. The environmental stimuli may also refer to various object or perception by sight (Horayangkura *et al.*, 2011; Kaymaz, 2012; Hedblom *et al.*, 2017). Transnet is not the only company in the port that deals with WLPH's. There are others also within the port that uses WLPH's to manage their "waste" and "pollution" problems. Their experience in dealing with the port waste and pollution activities, for instance oil spills and collection of overflowing waste might have influenced their negative response and perceive the port as being ineffective or

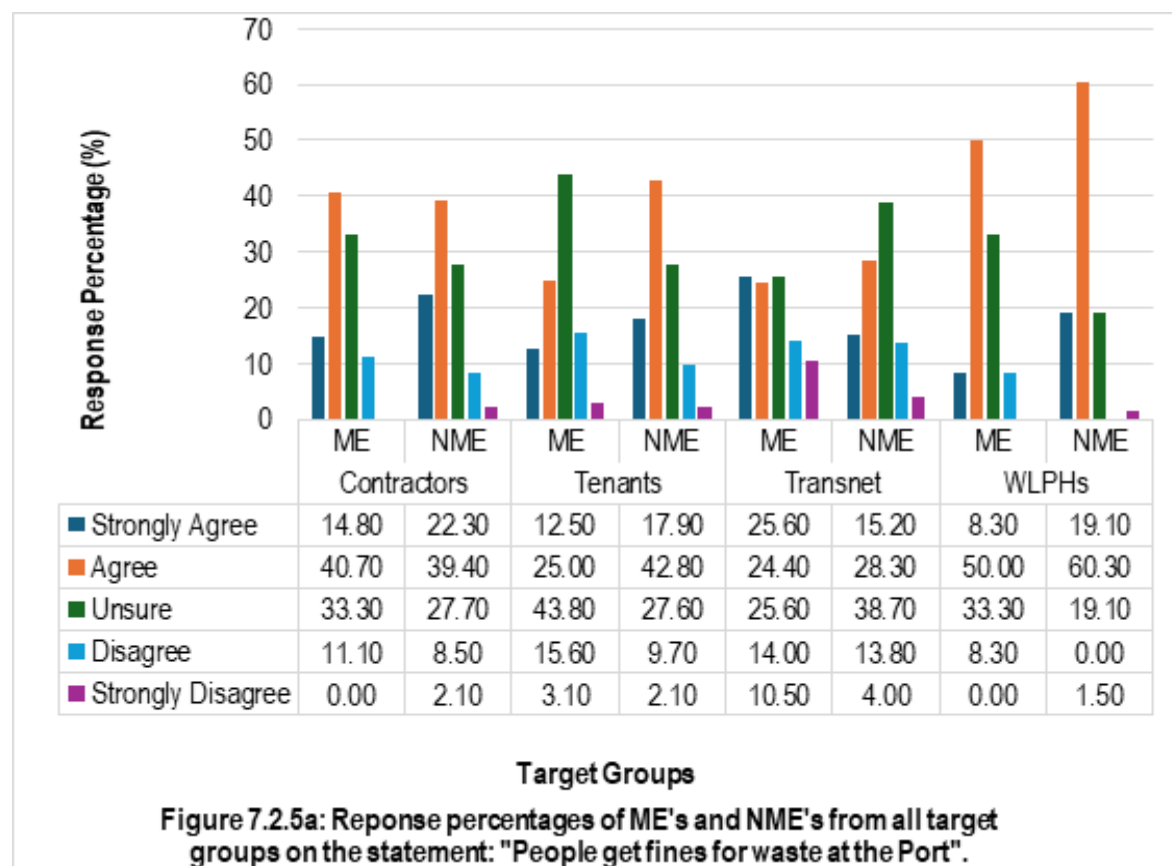
inefficient in managing these issues. It can be deduced that the negative response is driven from service experience in the port and as business perspective.

Less group of ME's and NME's "disagree" that waste and pollution was a problem at the port. In certain cases, the disagree is almost or as much as the agree. Environmental perception denotes to the progressions where individuals are capable to interprets environmental information, with their understanding be able to explain how they immediately perceive the environment (Suksri *et al.*, 2021). The knowledge about the environment and the problems of that environment does play an important role in contributing to people's understanding of their environmental perception and the required actions to be taken (Hunter *et al.*, 2010; Díaz-Siefer *et al.*, 2015; Paço & Lavrador, 2017). In understanding how people perceive the port environment, it helps to deal with pollution generated due to port activities. It is also important to understand stakeholder perceptions concerning port operations and their impact on the environment (Lozano *et al.*, 2020). In 2022 internal audit report of TNPA, one of the findings revealed that there are certain areas of the port environment, as far as waste and pollution conditions are concerned requires more attention while others were found to be compliant and well managed (TNPA, 2022c). This could possibly suggest that waste and pollution is managed differently in different parts of the port, better in some parts of the port than others. The size of Cape Town Port on land has 253ha and 9163ha on water area. There is multiple service rendered by the port. The port operational activities are strategically placed due to different operational risks and environmental impact. (TNPA, 2014d). Therefore, it could be possible that different operational activities may produce different waste and pollution, different impact on the environment. Then these differences might require unique methods of handling produced waste and pollution by those operational activities. All these may result to different management in those areas which might have influenced the perception of "disagree" to certain level of "agree" with the statement that "waste and pollution management is a problem at the port".

Very few of ME's and NME's "unsure" that waste and pollution management was a problem at the port. Berkes *et al.* (2000) defines environmental knowledge "as one's body of knowledge of the interdependency between human society and its natural environment". Madsen (1996) state that for people to be knowledgeable in response

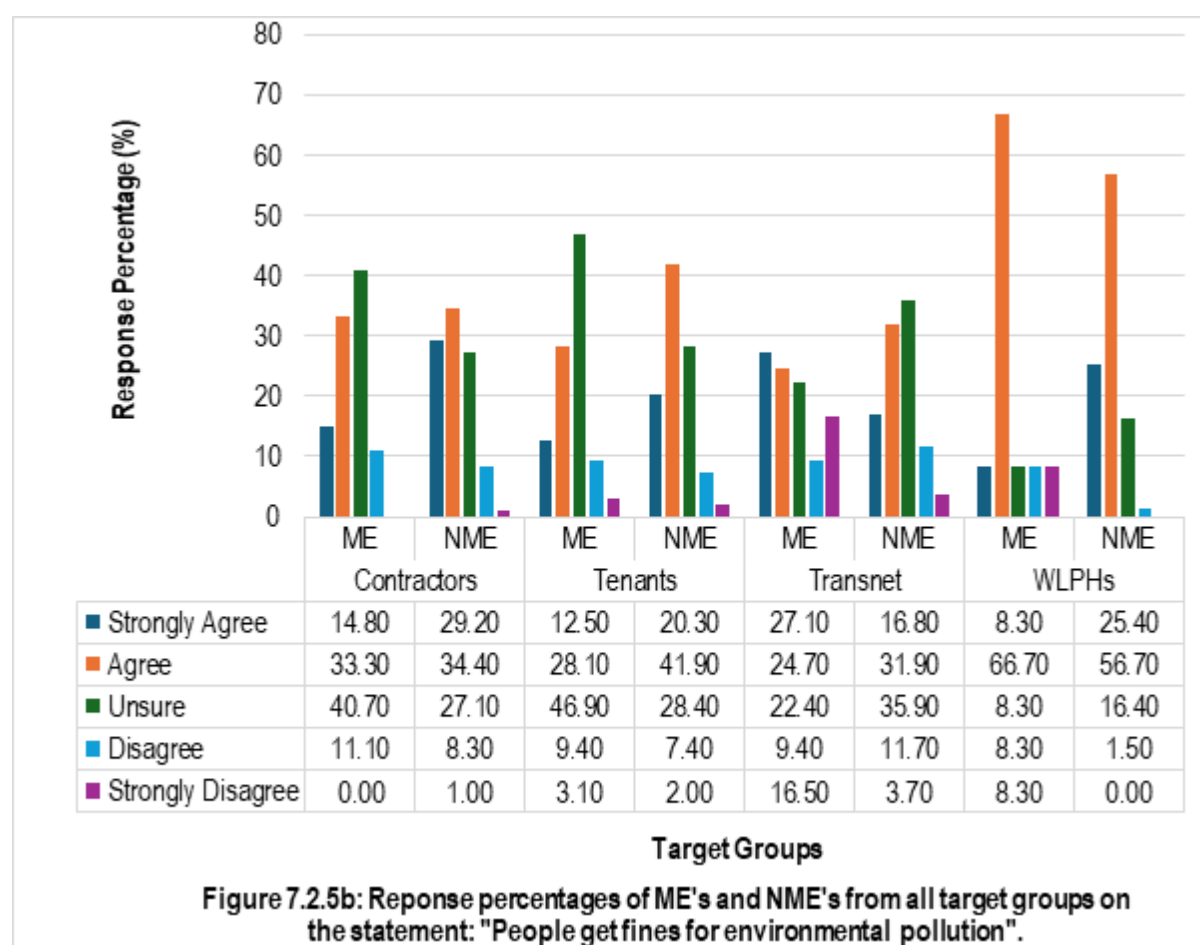
about something, awareness becomes a driving force for such a knowledge. Whyte (1977) argued that “Man’s perception of the environment is considered so fundamental that it becomes the main point of departure for any analysis of man-environment relations”. There are employees that may not have any opportunities to visit the port or be exposed to port environment because of their job description. Their work may limit them within their own organisation premises without going to the port premises. Although indirectly doing certain duties related to port services. For instance, booking a truck to go and collect waste in the Port of Cape Town. This type of work does not require anyone doing the administration process of booking truck to service waste and pollution in the Port to be there physically. Or these ME’s and NME’s may not deal with waste and pollution directly. Then in that way it could be possible that certain ME’s and NME’s may not have any knowledge of the port environment which may have contributed to their perception for “unsure” response.

7.2.5a Responses of ME's and NME's of all target groups regarding the statement: "People get fines for waste at the port"



There were no statistically significant differences between the ME's and NME's of all the target groups with regards to the statement: "People get fines for waste at the port" ($P > 0.05$) (Figure 7.2.5a).

7.2.5b Responses of ME's and NME's of all target groups regarding the statement: "People get fines for environmental pollution"



There were no statistically significant differences between the ME's and NME's of all the target groups with regards to the statement: "People get fines for environmental pollution in the port" ($P > 0.05$) (Figure 7.2.5b).

7.2.6.1 Contractors

The ME's and NME's chose the options of "strongly agree" (14.8 % and 22.3 %, respectively) and "agree" (40.7 % and 39.4 %, respectively) for the statement: "People get fines for waste at the port". Other ME's and NME's (33.3 % and 27.7 % respectively) chose the option of "unsure". Fewer of the ME's and NME's chose the options of "disagree" (11.1 % and 8.5 %, respectively) and "strongly disagree" (0 % and 2.1 %, respectively) (Figure 7.2.5a).

The ME's and NME's chose the options of "strongly agree" (14.8 % and 29.2%, respectively) and "agree" (33.3 % and 34.4 %, respectively) for the statement: "People get fines for environmental pollution in the port". Other ME's and NME's (40.7 % and 27.1 % respectively) chose the option of "unsure". Fewer of the ME's and NME's chose "disagree" (11.1 % and 8.3 %, respectively) and "strongly disagree" (0 % and 1.0 %, respectively) (Figure 7.2.5b).

In general, most ME's and NME's agreed that people get fines for waste and pollution offences at the port (Figures 7.2.5a and b). The Environmental Management Inspectors (EMI's) do environmental monitoring, compliance and enforcement throughout the country, including ports. Where there is contravention of the National Environmental Management Act, they issue a notice and hand the matter to the National Prosecution Authority (NPA) that issues fines and penalties (DEA, 2013/4). The Pollution Control Officer (PCO) job description indicates that this person should attend to all waste and pollution related incidents (like oil spills) within the port (Mostert, 2014; Wessels & Morrison-Saunders, 2011; TNPA, 2010a). In terms of Section 26 (1) of NEMA no person may dispose waste anywhere on land or water unless authorised and/or (2) causes environmental pollution. Section 67(1b) states that any person that contravenes or fails to comply in relation to waste and pollution commits an offense. Section 68(2) indicates that any person that offends the law in relation to waste and pollution is liable for a fine, imprisonment, or both (Republic of South Africa, 1998a). The Department of Environment, Forests and Fisheries (DEFF) (Previously known as Department of Environmental Affairs (DEA)) as well as South African Maritime Authorities visit ports for environmental inspections and issue fines, where necessary. It is the responsibility of the contractor to ensure that any waste and pollution offences during their operations in the port should be reported to the TNPA and other relevant authorities (DFFE, 2019; TNPA, 2008; Republic of South Africa, 2005). It is possible that the contractors might have received notices and fines or are at least aware of these consequences of failure to report waste and pollution incidents. Their responses may have also been influenced by the activities of the EMI's in the port, hence their perception that people do get fines for waste and pollution offences in the port. A very few of the respondents chose "disagree" (Figure 7.2.5a – b), they felt that fines are not issued.

Some ME's and NME's were "unsure" whether fines are issued for waste and pollution offences (Figures 7.2.5a and b). This can be due to their job functions not dealing with such matters. In some organisations, the SHE manager/officer is responsible for all environmental related issues, including waste and pollution. It is possible that some employees' uncertainty regarding fines for waste and pollution offences can be due to their managers not encouraging them to attend SHE meetings. It could be that certain managers themselves do not attend SHE meetings and do not understand the importance of these meetings (McComas, 2001; Nagy, 2014; Cogan, 2018).

7.2.6.2 Tenants

The ME's and NME's chose the options of "strongly agree" (12.5 % and 17.9 %, respectively) and "agree" (25.0 % and 42.8 %, respectively) for the statement: "People get fines for waste at the port". Another prominent choice by ME's and NME's (43.8 % and 27.6 %, respectively) were "unsure". The ME's and NME's chose the options of "disagree" (15.2 % and 9.7 %, respectively) and "strongly disagree" (3.1 % and 2.1 %, respectively) to a lesser degree (Figure 7.2.5a).

The ME's and NME's chose the options of "strongly agree" (12.5 % and 20.3 %, respectively) and "agree" (28.1 % and 41.9 %, respectively) for the statement: "People get fines for environmental pollution in the port". Many ME's and NME's (46.9 % and 28.4 % respectively) chose the option of "unsure". Much less of the ME's and NME's chose the options of "disagree" (9.4 % and 7.4 %, respectively) and "strongly disagree" (3.1 % and 2.0 %, respectively) (Figure 7.2.5b).

Most of the NME's and the second most of the ME's agreed that fines are issued for waste and pollution offences (Figures 7.2.5a and b). As indicated in heading 7.2.3.1 (*Contractors*) the DoL, the RS of the TNPA and Environmental Management Inspectors (EMI's) conduct random inspections in the port. In heading 7.2.3.1 (*Contractors*) it is indicated that there are certain operational activities that the tenants perform in the dry docks that are subject to SHE files approval. Furthermore, induction training processes are required in the same manner as for contractors, as explained in heading 4.2.1 (*Contractor responses ME's and NME's*) concerning environmental training programmes). In the SHE files the tenants must acknowledge that if they do not comply with waste and pollution management requirements, as per the relevant

rules and regulations, they are in danger of receiving fines for non-compliance (DoT, 2009; Republic of South Africa, 2008; ILO, 2008). It is thus understandable that tenants agreed that fines are issued for waste and pollution offences. This finding of the present study is supported by previous research. Helland (1998) indicated that the more frequent inspections are conducted by authorities to companies, the higher the chances of environmental compliance. Haque (2018) argued that to bring polluters under environmental compliance, even deterring them from future environmental violations, fines are found to be effective means of doing so. A very few of the respondents chose “disagree” (Figure 7.2.5a – b), they felt that fines are not issued.

A substantial proportion of tenant ME’s and NME’s chose “unsure” (Figure 7.2.5a – b). Most of the tenants appoint SHE managers and / or officers to be responsible for SHE related matters. These include the compilation of the SHE files and its correspondences, signing of the SHE obligation in relation to the law, fines, and penalties (DcD Dorbyl Marine Cape Town (Pty) Ltd, 2016). More often the majority of the tenant Directors issue a written resolution based on Companies Act 71 of 2008. Specifically, in Section 74 of this Act, stipulate that except to the extent that the Memorandum of Incorporation of a company may provide otherwise, a decision that could be voted on at a meeting of Directors, may instead be adopted by written consent of many Directors. In this case the Directors authorise the SHE Manager and / or Officer of the company to sign all documentation including correspondences related to SHE matters (Republic of South Africa, 2008; DcD Dorbyl Marine Cape Town (Pty) Ltd, 2016). In this manner most few employees are directly taking account in matters related to SHE compliance and fines. It may not be surprising for most of the ME’s and NME’s response of “unsure” due to possible ignorance on responsibilities not directly related to them and lack of knowledge that consequently affect their perception negatively.

7.2.6.3 Transnet

The ME’s and NME’s chose the options of “strongly agree” (25.6 % and 15.2 %, respectively) and “agree” (24.4 % and 28.3 %, respectively) for the statement: “People get fines for waste at the port”. Other ME’s and NME’s chose the options of “unsure” (25.6 % and 38.7 % respectively), “disagree” (14.0 % and 13.8 %, respectively) and “strongly disagree” (10.5 % and 4.0 %, respectively) (Figure 7.2.5a).

The ME's and NME's chose the options of "strongly agree" (27.1 % and 16.8 %, respectively) and "agree" (24.7 % and 31.9 %, respectively) for the statement: "People get fines for environmental pollution in the port". Other ME's and NME's chose the options of "unsure" (22.4 % and 35.9 % respectively) "disagree" (9.4 % and 11.7 %, respectively) and "strongly disagree" (3.7 % and 8.3 %, respectively) (Figure 7.2.5b).

The responses for ME's were almost equally split on the issue of fines for waste and pollution offences between "strongly agree", "agree" and "unsure". In heading 7.2.6.1 (*Contractors*) it was highlighted that inspections were conducted by the relevant authorities that issue fines for the contravention of environmental laws. The same practice is applied to Transnet. In 2020 the external legal compliance audit report stipulated areas of concern in relation to waste and pollution in different areas of the port for TNPA management to pay more attention to. Those areas were likely to attract fines and penalties should the issues be ignored (AKA Risk Management Specialists cc, 2020). It is possible that the ME's and NME's response percentages for those that "agree" and "strongly agree" were influenced by legislation, audits and the enforcement agencies' inspections and fines for offences. A very few of the respondents chose "disagree" (Figure 7.2.5a – b), they felt that fines are not issued.

Starovoytova & Namango (2018) argued that individual perception may vary from one person to the other due to their exposures and experiences. The knowledge and accessibility of information to individuals may influence their perception differently from one group of people to another (Fischer and Sciarini, 2015; Hamilton, 2018). An external audit report indicated a risk for TNPA that would attract fines and penalties if the attention is not given to certain areas of the port in issues relating to waste and pollution. It was revealed that not all the employees received training in legal requirements related to waste and pollution matters (GES, 2014). Furthermore, the current study found in heading 4.2.3 (*Transnet National Ports Authority responses (ME and NME's) concerning environmental training programmes*) that not all the employees received training. Also, in heading 5.2.7.3 it was found that not all Transnet ME's and NME's were knowledgeable with regards to environmental legislation. Consequently, uncertainty regarding fines may be due to those Transnet ME's and NME's that do not have relevant knowledge due to them not receiving the related training. Furthermore, it is possible that compliance and fines for environmental

offences are not part of certain Transnet ME's and NME's responsibilities. These could be contributing factors that led to the "unsure" responses (Figures 7.2.5a and b).

7.2.6.4 WLPH's

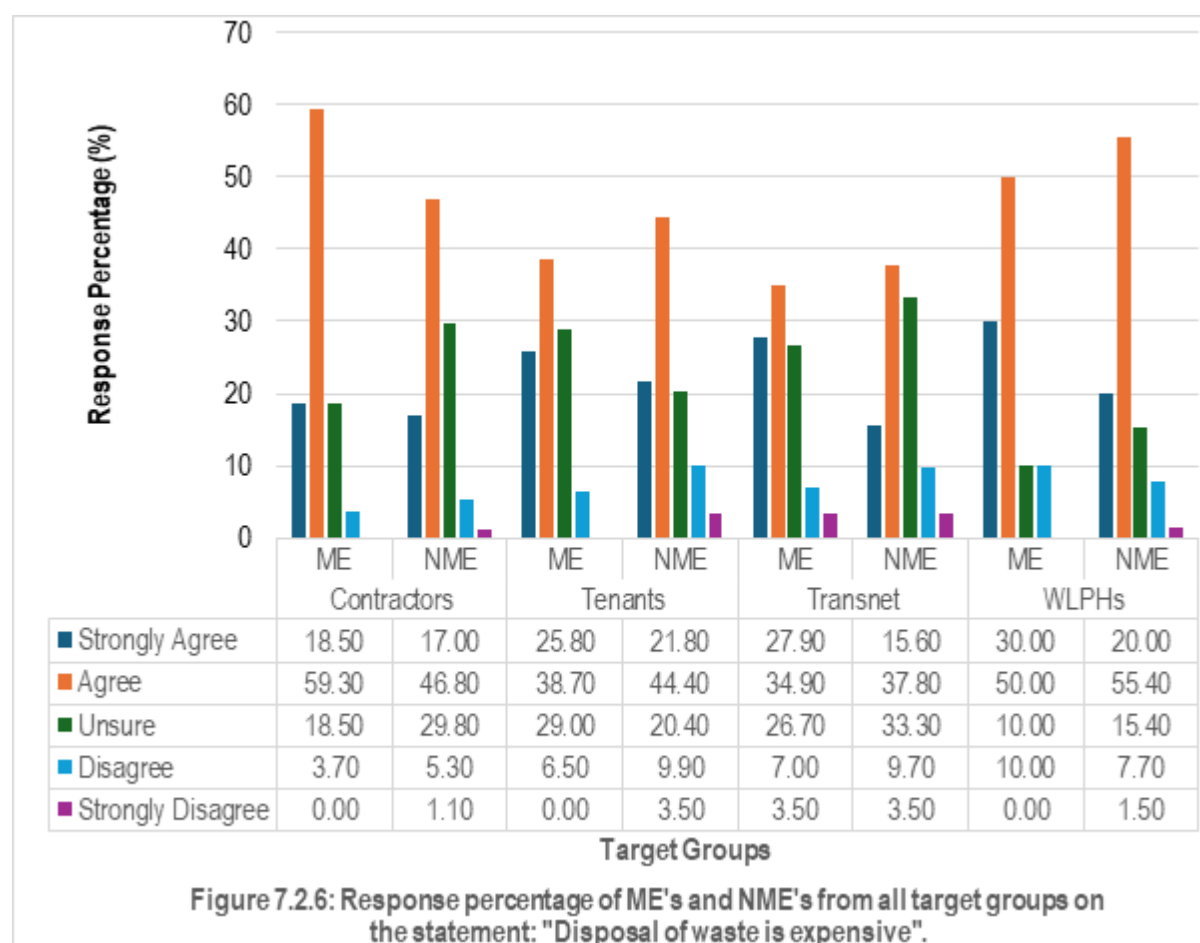
The ME's and NME's chose the options of "strongly agree" (8.3 % and 19.1 %, respectively) and "agree" (50.0 % and 60.3%, respectively) for the statement: "People get fines for waste at the port". Other ME's and NME's (33.3 % and 19.1 % respectively) chose the option of "unsure". Fewer of the ME's and NME's chose the options of "disagree" (8.3 % and 0 %, respectively) and "strongly disagree" (0 % and 1.5 %, respectively) (Figure 7.2.5a).

The ME's and NME's chose the options of "strongly agree" (8.3 % and 25.4 %, respectively) and "agree" (66.7 and 56.7 %, respectively) for the statement: "People get fines for environmental pollution in the port". Other ME's and NME's chose the options of "unsure" (8.3 % and 16.4 % respectively), "disagree" (8.3 % and 1.5 %, respectively) and "strongly disagree" (8.3 % and 0 %, respectively) (Figure 7.2.5b).

Wasserman (1984) argued that the environmental agencies conduct inspections as a means of enforcement. Shimshack (2014) stated that inspections and sanctions issued by enforcement agencies has the potential to deter future environmental violations and further encourage environmental compliance (Wasserman, 1984; Shimshack, 2014). Hao *et al.* (2018) found that not many research investigations have been conducted on the effectiveness of environmental regulations. However, many scholars have the opinion that environmental regulation is effective, and lead to lower levels of waste and pollution offences in the environment, leading to better environmental quality (Lo *et al.*, 2006; Gray & Shimshack 2011; Adshead, 2013). The ME's and NME's overwhelmingly agreed that people get fines for waste and pollution offences in the Port of Cape Town. The WLPH's are obliged, due to their contract conditions, to report waste and pollution offences in the port to the TNPA and other relevant external authorities (Republic of South Africa, 2005; TNPA, 2008;. DFFE, 2019/20). This may have contributed to their perception that fines are issued for waste and pollution offences. Furthermore, joint random inspections conducted by DEFF, SAPS and the local municipality and the TNPA in the port may result in fines for waste and pollution related offences. In cases where there is contravention of environmental

laws, the joint operations team has powers to issue notices of contraventions. The Environmental Management Inspectors (EMI's) can also issue notices and further relay the matter to the National Prosecution Authority for appropriate action (DEA, 2013/14). WLPH's are inspected by the joint operations team. Non-compliance and offences from WLPH's may result in notices, and in some instances, operations may not continue until the non-compliance is rectified. Inaction may result in the termination of the WLPH's contract (Republic of South Africa, 2005; DFFE, 2018; TNPA, 2018b; TNPA, 2019e; Caliskan, 2022). It therefore makes sense that most of the WLPH respondents (ME's and NME's) agreed that fines are issued. This perception is driven by the fact that they, on the one side report offences when they fulfil their contractual functions, and on the other side, they are inspected themselves to ensure that they do not break waste and pollution related legislation and regulations.

7.2.6 Responses of ME's and NME's of all target groups regarding the statement: "Disposal of waste is expensive"



There were no statistically significant differences between the ME's and NME's of all the target groups with regards to the statement: "Disposal of waste is expensive" ($P > 0.05$) (Figure 7.2.6).

The contractor ME's and NME's chose the options of "strongly agree" (18.5 % and 17.0 %, respectively) and "agree" (59.3 % and 46.8 %, respectively) for the statement: "Disposal of waste is expensive". Other ME's and NME's (18.5 % and 29.8 % respectively) chose the option of "unsure". Much less of the ME's and NME's chose "disagree" (3.7 % and 5.3 %, respectively) and "strongly disagree" (0 % and 1.1 %, respectively) (Figure 7.2.6).

The tenant ME's and NME's chose the options of "strongly agree" (25.8 % and 21.8 %, respectively) and "agree" (38.7 % and 44.4 %, respectively) for the statement:

“Disposal of waste is expensive”. Other ME’s and NME’s (29.0 % and 20.4 % respectively) chose the option of “unsure”. Much less of the ME’s and NME’s chose “disagree” (6.5 % and 9.9 %, respectively) and “strongly disagree” (0 % and 3.5 %, respectively) (Figure 7.2.6).

The Transnet ME’s and NME’s chose the options of “strongly agree” (27.9 % and 15.6 %, respectively) and “agree” (34.9 and 37.8 %, respectively) for the statement: “Disposal of waste is expensive”. Other ME’s and NME’s (26.7 % and 33.3 % respectively) chose the option of “unsure”. The ME’s and NME’s chose the options of “disagree” (7.0 % and 9.7 %, respectively) and “strongly disagree” (3.5 % and 3.5 %, respectively) to a much lesser degree (Figure 7.2.6).

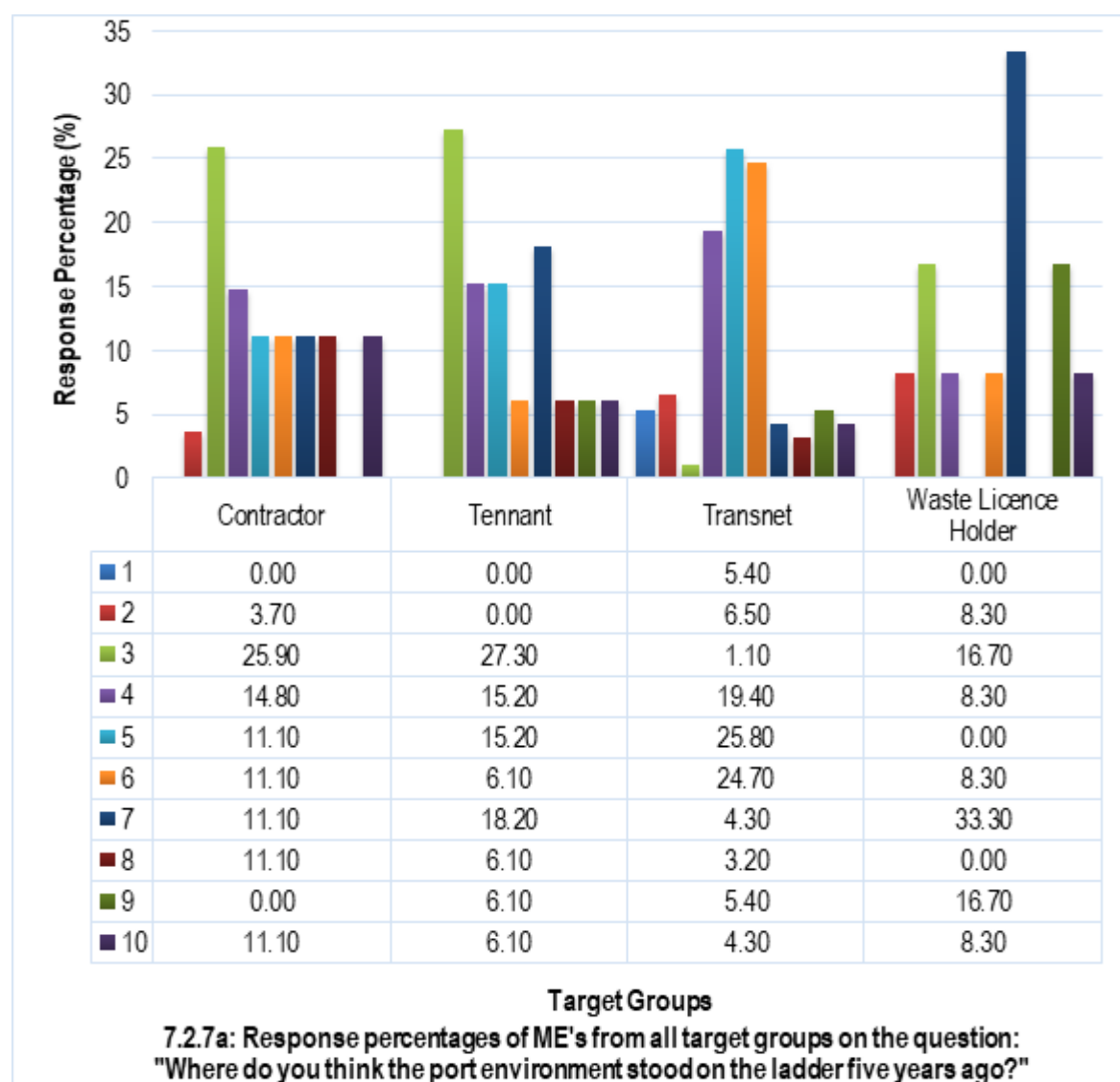
The WLPH ME’s and NME’s chose the options of “strongly agree” (30.0 % and 20.0 %, respectively) and “agree” (50.0 % and 55.4 %, respectively) for the statement: “Disposal of waste is expensive”. Much less ME’s and NME’s chose the option of “unsure” (10.0 % and 15.4 % respectively), “disagree” (10.00 and 7.70 %, respectively) and “strongly disagree” (0 % and 1.5 %, respectively) (Figure 7.2.6).

Generally, the ME’s and NME’s of all four target groups agreed that the disposal of waste is expensive. In heading 3.2.9, the results indicated that the waste recycling was encouraged in the workplace (Figure 3.2.15). In headings 3.2.3.1 - 3 and 4.2.1.1 - 3 it was found that “awareness” and “training” programmes were, to a large degree, offered to the employees of all the target groups. Ado (2019) argued that training and awareness have a significant influence on perception of people. During these training and awareness programmes on waste matters, the cost of waste disposal to the company forms part of the materials shared with the participants (TNPA, 2015a & 2020a). The cost of waste disposal could also be a motivating factor in encouraging employees to recycle. These issues form part of the Transnet IWMP. As port users, contractors, tenants and WLPH’s are required to comply with the Transnet IWMP (TNPA 2015, 2020a). Even though not all ME’s are responsible for waste, they are to a large degree aware of the cost of waste disposal. The costs are not disclosed due to confidentiality and waste tenders that are about to go to market. Waste is regarded as one of the top ten risk in the aspect and impact register (TNPA 2020a). In 2011 it was found that the generation of waste in South Africa was estimated at 108 million

tonnes, of which 98 million tonnes (90%) was discovered to be disposed of at the landfill sites. The waste was estimated at the value of 25.2 billion per year. This was considered as a great loss that can improve South African economy if correctly handled (DEA, 2016). Therefore, waste disposal is perceived by port users to be expensive.

Certain ME's and NME's were uncertain if waste disposal is expensive. The uncertainty whether waste disposal is expensive could be due to the fact that these respondents are not directly involved in waste management matters. Also, this level of uncertainty can also be because these respondents have not received training and awareness programmes regarding waste matters. This can be seen from the results on training and awareness programmes (Figure 3.2.3 – 12; Figure 4.2.1 -10; Table 3.2.5 – 6; Table 4.2.1 – 2). The GES (2014) audit report of the Port of Cape Town stipulated that the IWMP was in place at the time of the audit. However, the IWMP was determined to be outdated at the time of that audit. The report also indicated that the plan was poorly communicated to the employees of the Port of Cape Town, including other port users. The IWMP was updated in 2015 and then again in 2020 and (TNPA, 2015a & 2020a). In headings 5.2.8.1 - 4, it is revealed that although the IWMP was updated and made available to interested parties, it was still unclear if the IWMP was communicated to all employees of Transnet and other port users. It is therefore possible that the “unsure” responses came from those employees who did not receive any communications regarding the IWMP. Furthermore, in headings 3.2.3.1 - 3 and 4.2.1.1 - 3 it was found that “awareness” and “training” programmes were offered to the employees of all the target groups. However, it seems like certain employees did not receive awareness and training programme ((Figure 3.2.3 – 12; Figure 4.2.1 -10; Table 3.2.5 – 6; Table 4.2.1 – 2).

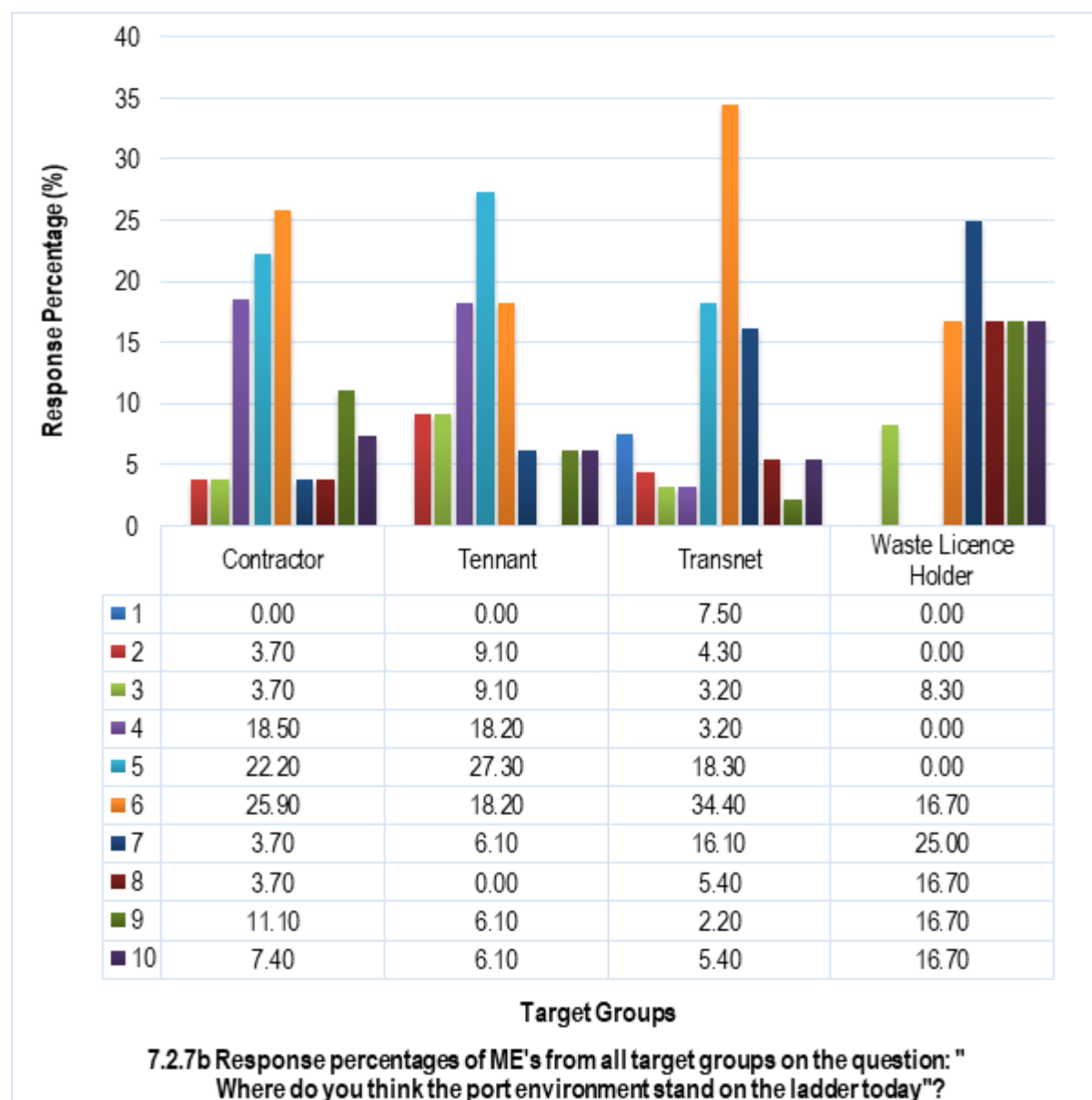
7.2.7 Responses of ME's of all target groups regarding the port environment in the past, at present and in the future



There were no statistically significant differences between the ME's of all the target groups with regards to the question: "where do you think the port environment stands on the ladder" ($P > 0.05$) (Figures 7.2.7a, b and c). The interpretation of the score is: (i) 1 – 4 = poor; (ii) 5-6 = average; (iii) 7-10 = good.

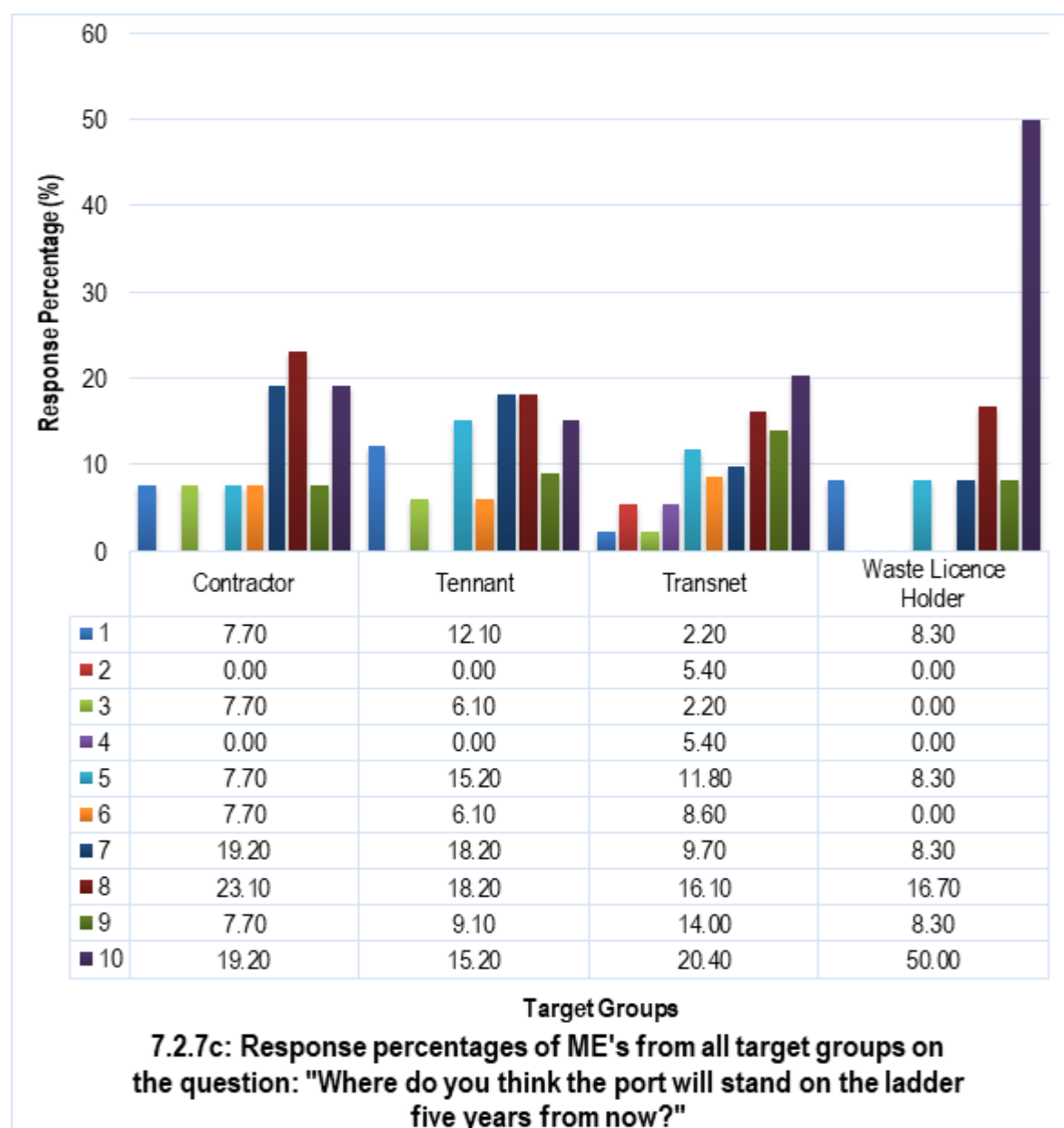
Most of the contractor ME's chose level 3 (poor), followed by level 4 (poor) in their responses regarding their perception of the port environment five years ago. Most of the tenant ME's chose level 3 (poor), followed by level 7 (good) in their responses. For Transnet most ME's chose levels 5 and 6 (average), followed by level 4 (poor) in their

responses to this question. WLPH ME's mostly chose level 7 (good), followed by levels 3 (poor) and 9 (good) regarding their perception of the port environment five years ago (Figure 7.2.7a).



Most of the contractor ME's chose level 6 (average), followed by levels 5 (average) and 4 (poor) in their responses regarding their perception of the port environment today. Respondents from the tenant ME's mostly chose level 5 (average), followed by levels 4 (poor) and 6 (average) in their responses. The majority of the Transnet ME's chose level 6 (average), followed by levels 5 (average) and 7 (good) in their responses to the question regarding their perception of the port environment at present. WLPH

ME respondents mostly chose level 7 (good). This was followed by levels 6 (average), and 8 – 10 (good) (Figure 7.2.7b).



The majority of the contractor ME's chose level 8 (good), followed by levels 7 and 10 (good) in their responses regarding their perception of the port environment five years into the future. Most of the tenant ME's chose levels 7 and 8 (good), followed by levels 5 (average) and 10 (good) in their responses. Transnet ME's mostly chose level 10 (good), followed by levels 8 and 9 (good). WLPH ME respondents overwhelmingly chose level 10 (good), followed by level 8 (good) in their responses regarding their perception of the port environment five years into the future (Figure 7.2.7c).

The contractors' perception of the port environment shifted gradually between "five years ago", "today" and "five years from now", from poor, to average and to good. The contractors therefore have a positive and optimistic future outlook in terms of the port environment. The tenants' perception of the port environment also shifted in a positive direction between "five years ago", "today" and "five years from now", from poor, to average and to good. This optimistic outlook of contractor and tenant ME's can be ascribed to various factors. Previously the contractors were not efficiently managed in the port. The external audit conducted in the Port of Cape Town revealed that contractor management related to SHE was a major problem in the port (GES, 2014). In 2015, the Service Level Agreement (SLA) was drafted, addressing the role of the Risk Specialist, Business Unit Managers, supervisors, employees, and the contractors. The document, among other issues, was to guide the process of contract management and the key role players. The SLA document was effective from early 2016 in the Port of Cape Town (TNPA, 2015d). However, this document seems not have been fully implemented by all role players, as yet. Currently the following activities and related documents must be implemented and submitted to the satisfaction of the TNPA. (i) A detailed risk assessment that indicates steps that must be taken to ensure operational risk assessment procedures are in place and performed; (ii) The contractor or tenant questionnaires that include integrated management requirements must be completed; (iii) Contractor or tenant induction and training must take place. This process takes place before the work site is handed over to the contractor or tenant by the TNPA. The induction training programmes include safety, health and environmental issues. (iv) Inspections, audits, monitoring, and enforcement must take place (Transnet SOC Ltd, 2019). All these control measures seem to have added value in the improvement of the management of the port environment. These recent requirements may have positively contributed to the optimistic future outlook of the contractor and tenant ME's, although some improvements in terms of implementation are still required.

Transnet ME's perception of the port environment shifted between "five years ago", "today" and "five years from now", from average, to average and to good. Again, one finds a positive future outlook in terms of the port environment. These ME's did not feel that there was much of a change from "five years ago" to "today" but are optimistic for the future since most of them chose level 10 for the "five years from now" question.

Since 2018, the Port of Cape Town has been visited by DEFF for inspections on numerous occasions. Several letters of intention have been given to the port for poor environmental status due to waste and pollution problems (DEFF, 2019). In this process the port was given a specific time frame to rectify identified poor environmental conditions. Amongst others, Transnet had to ensure that they improve the cleanliness (as it relates to waste and pollution) of the port environment. Other external audits have also taken place to identify the areas in the port where improvements are needed for the benefit of the port environment. These audit reports indicated areas that were unsightly as far as waste and pollution was concerned - TNPA had to pay attention to these (GES, 2014; Advantage ACT, 2016). Regular external inspections and audits may have contributed to improved management of the port environment and consequently a more positive future outlook as perceived by the Transnet ME's.

The WLPH ME's were generally very positive in terms of their perception of the port environment. They perceived the port environment to be in good condition, in the past, the present and in the future. In fact, they feel that the port environment will improve. This is evidenced by the shift from level 7, for the past and the present, to level 10 for the future. The WLPH's core business in the port deals with waste and pollution related matters, as indicated in heading 2.9.4. The contracts for waste and pollution related services in the Port of Cape Town to service providers were normally a year and sometimes two years (TNPA 2016). The period for these contracts is too short. The longer the waste and pollution contracts for WLPH's, the more advantageous it is for the business. The waste contract for general, hazardous and galley waste for the port was for the period of three years. Every year in this three-year period the value of the contract increased incrementally, which affected the contract total value positively, which is good for business (TNPA, 2018d). In 2012 the port implemented a waste license permit oversight role. This was later followed by monitoring, enforcement, and auditing of the waste service providers (Republic of South Africa, 2005; TNPA, 2016). The Environmental Specialist (ES) and Risk Specialist (RS) of the TNPA took up this role and conduct annual audits on waste service providers (TNPA 2018, TNPA 2019). All these factors may have contributed to the very positive future outlook of the WLPH ME's.

PRACTICE

ABSTRACT

There are fundamental principles in waste management that are neglected without being addressed and continue to prevent the realisation of practising an effective way of minimizing waste. The fundamental principles such as (i) inadequate awareness in waste minimization, (ii) inadequate information that focuses on minimisation of waste, and (iii) inadequate expertise and human resources. Due to these challenges, there is a need for capacity building in the field of waste minimization and management practice. Practices are simply organised methods in which things are being performed. The performance, which is the result of practices, includes (i) shared cultural meanings, (ii) socially learnt skills as well as (iii) people's shared orientation to each other. Practices can also be recognised as tasks that are being performed by individuals and realise a need to involve others to assist them in order to succeed in those tasks to be performed. The data has been analysed by using SPSS 25 software programme and Microsoft Office Excel. The majority of the all the target group practice environmental care in operational activities. This practice is also supported by the reporting of environmental occurrences so that they may be addressed as soon as possible. The lessons learnt from work, the employees' practice such at home. For instance, waste segregation, recycling and housekeeping among others are being practiced at home. The port of Cape Town is also supported by the government institutions as far as waste and pollution management is concerned.

8.1 INTRODUCTION

Mallak *et al.* (2018) argued that there are fundamental principles in waste management that are neglected without being addressed and continue to prevent the realisation of practising an effective way of minimizing waste. The fundamental principles include, (i) inadequate awareness in waste minimization, (ii) inadequate information that focuses on minimisation of waste, and (iii) inadequate expertise and human resources. Due to these challenges, there is a need for capacity building in the field of waste minimization and management practice.

Warde (2014) stipulates that practices are simply organised methods in which things are being performed. The performance, which is the result of practices, include (i) shared cultural meanings, (ii) socially learnt skills as well as, (iii) people's shared orientation to each other. Southerton and Welch (2015) indicated that practices can also be recognised as tasks that are being performed by individuals and realise a need to involve others to assist them to succeed in those tasks to be performed.

Reckwitz (2002) defined "A 'practice' ... as a routinised type of behaviour which consists of several elements, interconnected to one another: forms of bodily activities, forms of mental activities, things and their use, a background knowledge in the form of understanding, know how, states of emotion and motivational knowledge." According to Rouse (2007) "practice is not a regularity underlying its constituent performances, but a pattern of interaction among them that expresses their mutual normative accountability".

Warde (2005) adapting Schatzki (1996) indicates that 'practice' components can be defined into three categories. These categories are (i) "procedures" (guidelines, values, advice) (ii) "understandings" (knowing how and providing the explanation that is practical); (iii) "engagements" (affecting and standardising what is normally expected to be done, as well as an arrangement of ends and projects). Shove *et al.* (2012) proposed three types of practice components such as meanings, competence, and materials. The "meanings" simply include customs, anticipation and educational conventions, "competence" has to do with the skills and know-how effective was the performance of the practice, while the elements of "material" emphasise how practices

are at all times severely intertwined with infrastructures, tools, technologies and objects (Shove *et al.*, 2012; Shove, 2017).

Steg and Vlek (2009) indicated that there are ways that may safely guard the environment when put into practice to manage waste better involving the public and private domains (e.g recycling) (Welch, 2017). Agamuthu and Fauziah (2011) stated that one of the major challenges are regulatory frameworks that are inadequate and inefficient policies that are not suitable for the 3Rs (Recycle, Re-use, and Reduction). These inefficiencies allow manufacturing industries to not control the quantity of waste generated and the management thereof. Sreenivasan *et al.* (2012) indicated that in the early 1980's one of the countries that started to practice the 3Rs (Recycle, Re-use, and Reduction), with an aim to manage their waste better, was Malaysia. The teleo-affective structures connect the person's actions and the sayings of practices through a normatively well-organized array of ends, positioning, and motivational obligations (Schatzki, 1996; 2002).

Welch (2017) argued that the central focus of query-and involvement, theoretically – rather than persons and their preferences or their attitudes, or groups such as morals, customs, or societal structures are noted become practices. Shove *et al.* (2012) and Spurling (2013) pay much attention on competences with an understanding that “competences” it's a key for practical success.

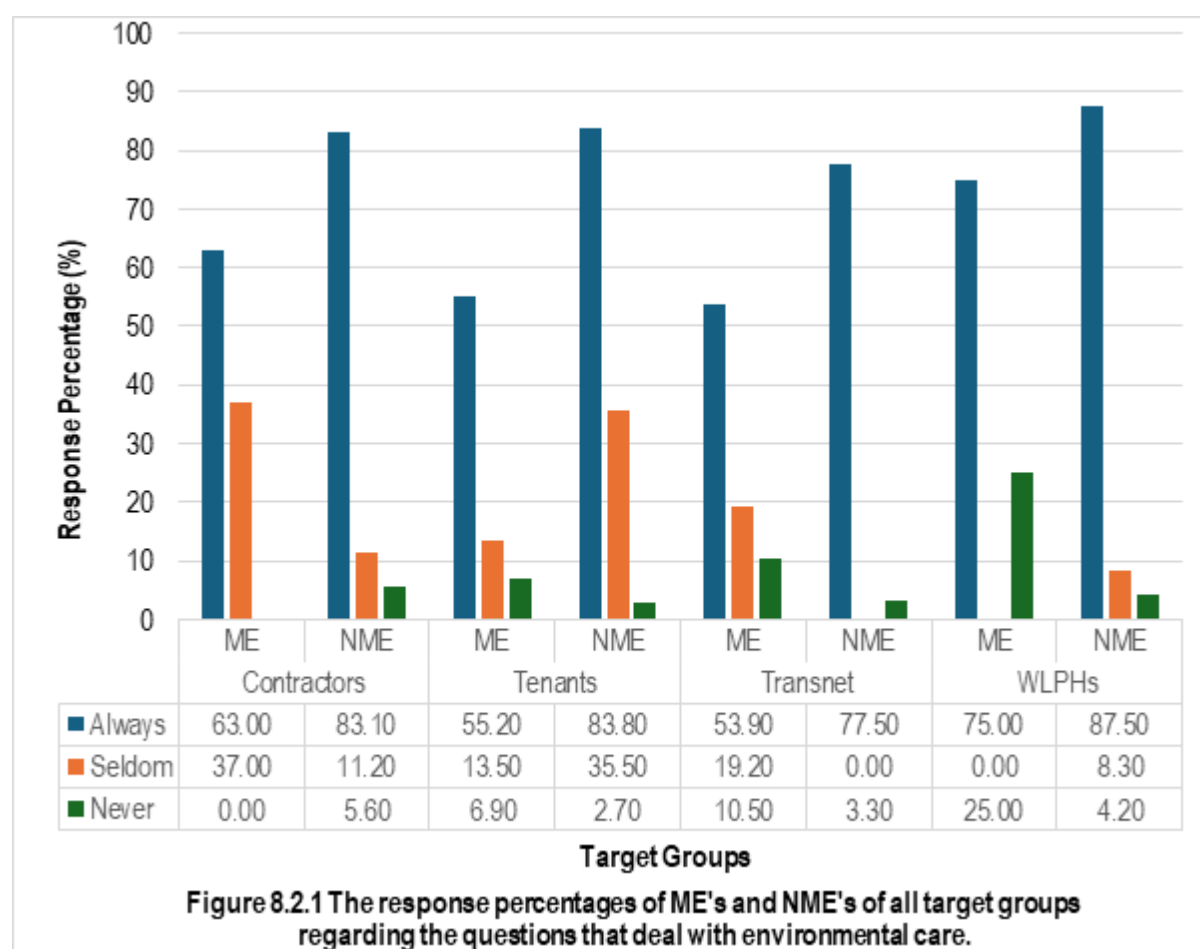
The research objectives as it relates to this chapter are: To ascertain the environmental practices in Port of Cape Town users, especially in waste and pollution matters. Also, to engage the local government, to determine the role they play to support of environmental practices at the Port of Cape Town.

8.2 RESULTS AND DISCUSSION

When reference is made to Transnet in the results it refers to the Transnet National Ports Authority (TNPA). The contractors, tenants, Transnet and Waste Licence Permit Holders (WLPH's) were the target groups of this study, as well as specific government department officials, as detailed in chapter 2. Self-administered questionnaires were

used on managerial employees (ME's) and the non-managerial employees (NME's) of the four target groups. Data was also collected from government department officials by means of structured interviews. The collected data was tabulated and coded (Appendix A10.1&2). An explorative descriptive study and statistical analysis was done using SPSS 25 software and Microsoft Office Excel (Shil *et al.*, 2013; Appendix A12.1&2). The data mainly consists of non-parametric ordinal and nominal data. Chi-Square analysis was used to search for statistical significant influences of independent variables on dependent variables.

8.2.1 Responses of ME's and NME's of all target groups regarding the questions that deal with environmental care



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the questions: [for ME's] "How often do you caution your staff about environmental care in their work?" and [for NME's] "How concerned are you about environmental care when you do your job?" ($P > 0.05$) (Figure 8.2.1).

8.2.1.1 Contractors

The NME's and ME's overwhelmingly chose the option of "always" (83.1 % and 63.0 %, respectively) regarding the question that deals with environmental care (Figure 8.2.1). Much less of the ME's (37.0 %) and NME's (11.2 %) chose the option of "seldom". Only a few NME's chose the option of "never" (5.6 %) (Figure 8.2.1).

According to the majority of the ME's they "always" caution NME's about environmental care in their work. In line with this, the NME's mostly indicated that they are concerned about environmental care in the work activities. In heading 5.2.9.1 (*Contractors*) the employees received awareness programmes on the environmental management plan before commencing with their operational activities. It seems as if the contractors do ensure that staff members are being made aware of the requirements of the EMPs for their operations (TPT, 2012). Durning (2012) stated that in 1999 the World Bank established guidance on EMP's. This was done in order to provide ways to predict the impact and also to provide the control measures that need to be implemented to mitigate the impacts that were identified in operational activities. In so doing good practices can be developed in order to take care of the environment. It is possible that these good practices due to exposure to the EMP, influenced the response percentages of the NME's and ME's.

In heading 3.2.3 (*The types of environmental awareness programmes offered by ME's to NME's*), the responses from ME's and NME's ranged from 48.6 % to 100% in the subjects of air, waste, pollution, oil spill and water. The responses varied from one subject to the other. It was found that some employees did not receive environmental awareness programmes. According to ECOSOC (2017) promotion of environmental awareness to the employees at workplace has a positive effect in their practice towards the environment. It is thus possible that those employees that choose "seldom" and "never" might not have received environmental awareness programmes.

8.2.1.2 *Tenants*

The NME's and ME's mostly chose the option of "always" (83.8 % and 55.2 %, respectively) regarding the issue of environmental care. Less of the ME's (37.9 %) and NME's (13.5 %) chose the option of "seldom". Very few of the ME's and NME's chose the option of "never" (6.9 % and 2.7 %) (Figure 8.2.1).

According to most of the ME's the NME's were "always" cautioned about environmental care in their work. The responses of the NME's are in line with those of the ME's since the vast majority of them reported that they care about the environment. Heading 5.2.9.2 (*Tenants*) indicated that there were EMP's in place. These plans are implemented by the Safety, Health and Environment Officers and/or Specialists of tenants to ensure that all staff members are made aware of their duties in terms of the environment before they commence operational activities (DCD Dorbyl Marine Cape Town (Pty) Ltd, 2016). To influence society to a certain desired practice, knowledge-based methods of awareness has been found to be beneficial to bring change (Jordan *et al.*, 1986; Boerschig & De Young, 1993; Pratkanis and Turner, 1994). Puente-Rodríguez *et al.* (2016) stated that raising awareness in the industrial (port) environment can easily help to manage and reduce environmental impact, especially when the processes are documented and put into practice. It is therefore possible that knowledge gained through awareness and the implementation of EMP's influenced the ME's practice to "always" caution staff about environmental care in the workplace.

Anker *et al.* (2015) suggested that environmental legislation guide practices as it relates the environment. In heading 5.2.7.2 (*Tenants*) on the matter of being informed of the environmental legislation. Certain employees choose "unsure." Gong & Zhang (2017) suggested that feedback has a potential to influence employees positively and eventually increase their performance in operations. Failure to provide a feedback platform to the entire team, may result in inadequate knowledge that may comprise practices. This may have contributed to some of the respondents choosing "seldom" and "never" on the matter of environmental care.

8.2.1.3 *Transnet*

The NME's and ME's mostly chose the option of "always" (77.5% and 53.9 %, respectively) regarding the question that deals with environmental care. Less ME's

(35.5 %) and NME's (19.2 %) chose the option of "seldom". Only a few ME's and NME's chose the option of "never" (10.5 % and 3.3 %) (Figure 8.2.1). For the most part employees "always" take care of the environment in the context of their work. In heading 5.2.9.3 (*Transnet*) it is indicated that the TNPA has approved EMP's that are implemented at the operational levels. It is the responsibility of the Environmental Officer (EO) and / or Environmental Specialist (ES) to ensure that the employees are made aware with the requirements of the EMP's (TNPA, 2015b&f). It is also the responsibility of Transnet to ensure that EMP's are implemented at all levels of operations and projects (TPT, 2012). In a study conducted by Boo and Park (2013) it was found that prior environmental knowledge and educational experience is a contributing factor in influencing practice. In an interview with the local authority, the responses argued that "protection of environment is to avoid illegal or negative impacts from waste originating from the port to the city metropolitan area". "the city becomes involved on waste and pollution that leaves the port and or impact outside". The local authority is also concerned about the protection and care to the environment. It is thus possible that the knowledge the staff have in relation to EMP's, due to awareness programmes, training received, and their work experience, influenced their practice with regards to environmental care in their work context.

In heading 3.2.3 (*The types of environmental awareness programmes offered by ME's to NME's*), the responses from ME's and NME's ranged from 34.2 % to 76.5 % in the following subjects of awareness (air, waste, pollution, oil spill and water). The study revealed that not all the employees received awareness programmes. Similarly, in Tables 4.2.1 and 4.2.2, it was revealed that not all the employees received environmental training in air, pollution, water, waste and oil spill. Gadenne *et al.* (2009), suggested that implementation of environmental management practice was influenced by environmental awareness, training, legislations, attitude and knowledge. In heading 5.2.7.3 (*Transnet*), Some employees chose "unsure" and "disagree" for the statement: "I am informed of the environmental legislations". *This is an indication of a lack of knowledge on environmental legislation.* It is possible that the "unsure" and "never" responses are a result of a lack of environmental awareness, training, legislation and knowledge (Gadenne *et al.*, 2009).

8.2.1.4 Waste License Permit Holders

The NME's and ME's overwhelmingly chose the option of "always" (87.5 % and 75.0 %, respectively) regarding environmental care. Only a few NME's (8.3 %) chose the option of "seldom". Some of the ME's and NME's chose the option of "never" (25.0 % and 4.2 %) (Figure 8.2.1).

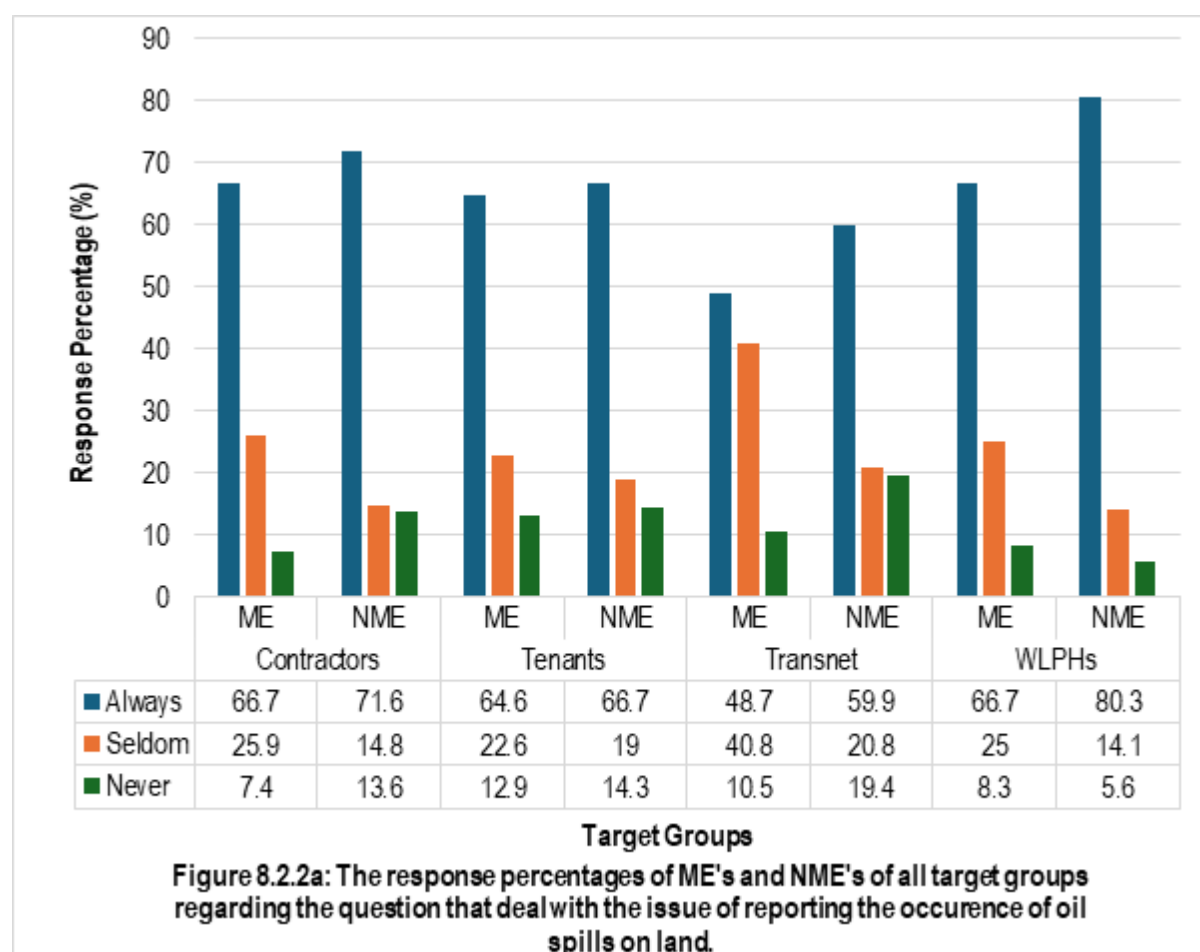
From the results it can be deduced that caring for the environment is important for most of the ME's and NME's. In heading 5.2.9.4 (*WLPH's*) it is indicated that the WLPHs have EMP's in place. Past audits also revealed that they do make use of the OEMP's (operational environmental management plans). Attendance registers of attending employees are evidence that training, and awareness programmes are offered to improve the knowledge of employees (TNPA, 2015e). Gadenne *et al.* (2009) found that that greater environmental awareness results in more environment care. The findings of the current study is in corresponds with that of Gadenne *et al.* (2009).

The interviews were conducted with the Solid waste and the Environmental Resources Department of the City of Cape Town which gave their practice in relation to the Port of Cape Town. The interviews responded to the question: How does your department involve the Port of Cape Town and its users in waste and pollution management issues and what is the level of engagement?

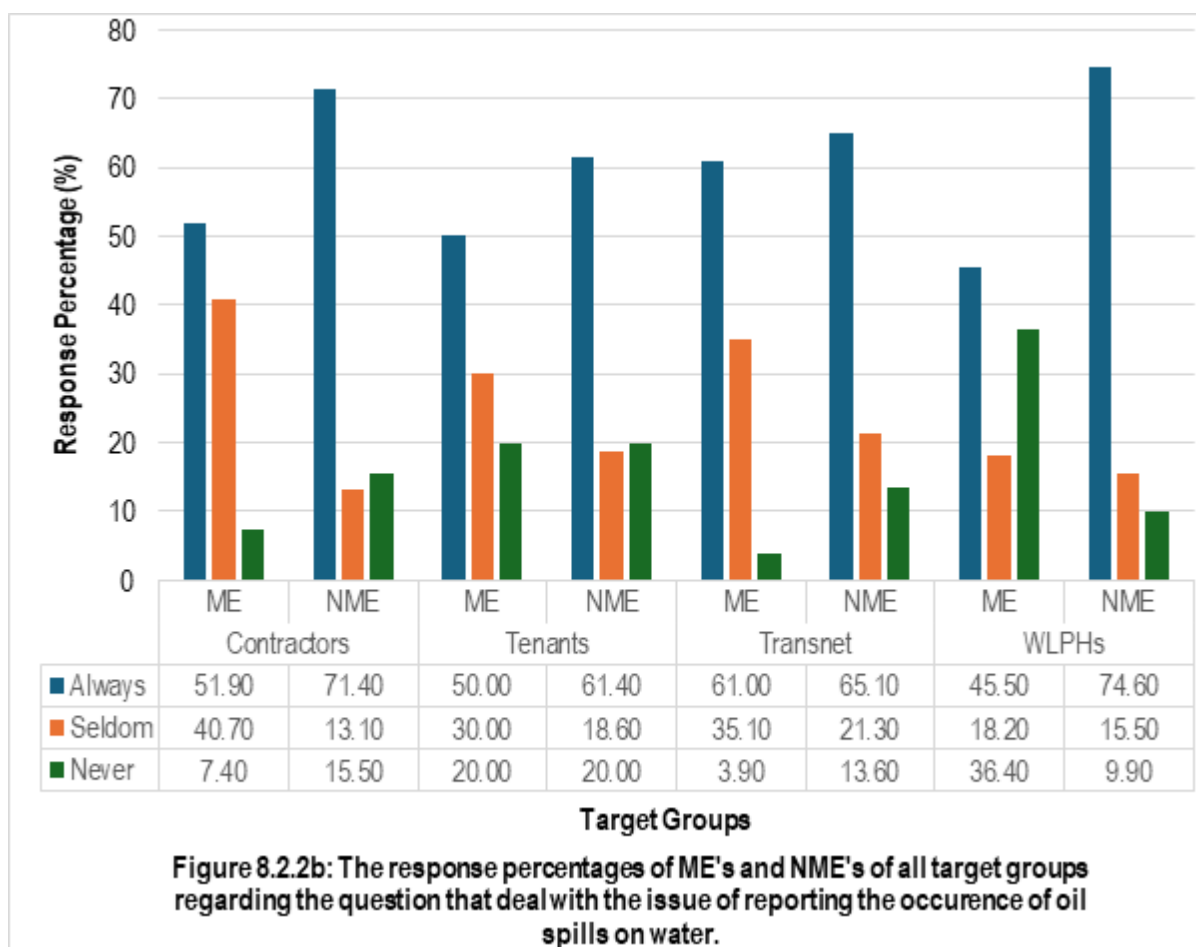
"All the waste plans, by laws and documents are always made available for public comment and input before finalization and promulgations".

This gives the port an opportunity to participate.

8.2.2 Responses of ME's and NME's of all target groups regarding the questions that deal with the issue of reporting the occurrence of oil spills on land and water



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the questions: [for ME's] "How often do your employees report the occurrence of oil spills on land?" and [for NME's] "How often do you report the occurrence of oil spills on land?" ($P > 0.05$) (Figure 8.2.2a).



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the questions: [for ME's] "How often do your employees report the occurrence of oil spills in the water?" and [for NME's] "How often do you report the occurrence of oil spills in the water?" ($P > 0.05$) (Figure 8.2.2b).

8.2.2.1 Contractors

The majority of NME's and ME's chose the option of "always" (71.6 % and 66.7 %, respectively) regarding the questions that deal with the issue of reporting the occurrence of oil spills on land. Much less of the ME's (25.9 %) and NME's (14.8 %) chose the option of "seldom". Only a few ME's and NME's chose the option of "never" (7.4 % and 13.6 %) (Figure 8.2.2a).

Most of the NME's and ME's chose the option of "always" (71.4 % and 51.9 %, respectively) regarding the questions that deal with the issue of reporting the occurrence of oil spills in the water. Less of the ME's (40.7 %) and NME's (13.1 %)

chose the option of “seldom”. Only a few NME’s and ME’s chose the option of “never” (15.5 % and 7.4 %) (Figure 8.2.2b).

According to the most of ME’s and NME’s the occurrences of oil spills on land and in water are reported (Figure 8.2.2a; 8.2.2b). In heading 6.2.6.1 (*Contractors*) on the employee's attitudes most of the employees indicated that “pollution is everyone’s problem in the company”. This links well with the current finding on reporting oil spills. According to Raubex Construction Pty (Ltd) (2017) the SHEP file requires that all employees are responsible to avoid pollution, including oil spills, during their operational activities. The Transnet oil spill contingency plan is also shared with contractors before they start their working activities in the port so that they can align their oil spill plan with that of the Port of Cape Town. This plan stipulates that environmental pollution, including oil spills, on Transnet premises on land or in the water should be reported immediately or within 24 hours of its occurrence, although the legislation allows more days for reporting (Republic of South Africa, 2018a, TNPA, 2019a; SAMSA, 2020). Furthermore, other relevant authorities must be informed as well, i.e., SAMSA, DEFF and other relevant parties. Patterson *et al.* (2017) argued that whenever oil spill reporting procedures are in the public domain there is improvement in the management of oil spill risks and possible environmental damage can be limited. The practice of “always” reporting the occurrence of oil spills on land and in the water by ME’s and NME’s may have been influenced by the responsibility of individuals towards pollution due to knowledge and positive attitudes (Stewart, 2015; Patterson *et al.*, 2017 ; Gerbrandt & Westman, 2020; Sabela-Rikhotso, 2022; Blake, 2024).

8.2.2.2 Tenants

The NME’s and ME’s overwhelmingly chose the option of “always” (66.7% and 64.5 %, respectively) regarding the questions that deal with the issue of reporting the occurrence of oil spills on land. Less of the ME’s (22.6 %) and NME’s (19.0 %) chose the option of “seldom”. Only a few ME’s and NME’s chose the option of “never” (12.9 % and 14.3 %) (Figure 8.2.2a).

The NME’s and ME’s mostly chose the options of “always” (61.4 % and 50.0 %, respectively) regarding the questions that deal with the issue of reporting the occurrence of oil spills in the water. Fewer of the ME’s (30.0 %) and NME’s (18.6 %)

chose the option of “seldom”. Some other ME’s and NME’s chose the option of “never” (20.0 % and 20.0 %) (Figure 8.2.2b).

According to the results oil spills in water and on land are reported most of the time (Figure 8.2.2a; 8.2.2b). In terms of Section 62 of the National Ports Act (no 12 of 2005), port users are required to comply with all the environmental laws and regulations. The tenants at the Port of Cape Town are obliged to inform both TNPA and the local authorities of any incidences caused by their operations that may have a negative impact to the environment within the period of 24 hours. This includes oil spills on land and in water. Failure to do so, may result in the TNPA suspending the operations of such a tenant for a reasonable period (Republic of South Africa, 2005). It is possible that the practice of “always” reporting the occurrence of oil spills may be because reporting of such incidences is a legal requirement. Lee (2017) suggest that legal requirements can influence the practice of the organisation. In the study conducted by Mijatovic *et al.* (2019), it was revealed that good environmental practice was observed among some of the companies. The manufacturing companies were more cooperating with government and local administration in environmental compliance than the services companies, as far as reporting pollution and harm to the environment.

8.2.2.3 Transnet

The NME’s and ME’s mostly chose the option of “always” (59.9 % and 48.7 %, respectively) regarding the questions that deal with the issue of reporting the occurrence of oil spills on land. Fewer ME’s (40.8 %) and NME’s (20.8 %) chose the option of “seldom”. Some other ME’s and NME’s chose the option of “never” (10.5 % and 19.4 %) (Figure 8.2.2a).

The NME’s and ME’s mostly chose the option of “always” (65.1 % and 61.0 %, respectively) regarding the questions that deal with the issue of reporting the occurrence of oil spills in the water. Other ME’s (35.1 %) and NME’s (21.3 %) chose the option of “seldom”. Only a few NME’s and ME’s chose the option of “never” (13.6 % and 3.9 %) (Figure 8.2.2b).

According to the findings of this study the occurrences of oil spills on land or in water are mostly reported by Transnet employees (Figure 8.2.2a; 8.2.2b). In heading 6.3.6.2 (*Transnet*) it was found that employees felt that “pollution is everyone’s problem in the company”. This is an indication of the positive attitude of employees in relation to environmental issues. The Port of Cape Town oil spill contingency plan indicates that all oil spills should be reported immediately to the Harbour Master, TNPA SHE department and the pollution control team (TNPA, 2019a). The South African National Oil Spills Contingency Plan (NOSCP) of 2019 states that the owner or operator of an oil spill facility or the owner of any place on land is responsible for the reporting of oil spill incidents that occur (DoT, 2019). Most of the oil spills occur at the sites of the port’s operational activities or near the port (ITOPF (Ltd), 2014a). The TNPA has the responsibility to report oil spills at the port to the relevant authorities (SAMSA, DEFF, SAPS and municipality) regardless of whether the oil spill was caused by them or not. Due to their obligation to report oil spills to these authorities, it is possible that the finding that ME’s and NME’s mostly “always” report oil spills were influenced by their legal obligation to these authorities. This is in line with the findings of Lee (2017) that found that legal requirements can influence practices in organisations.

8.2.2.4 Waste License Permit Holders

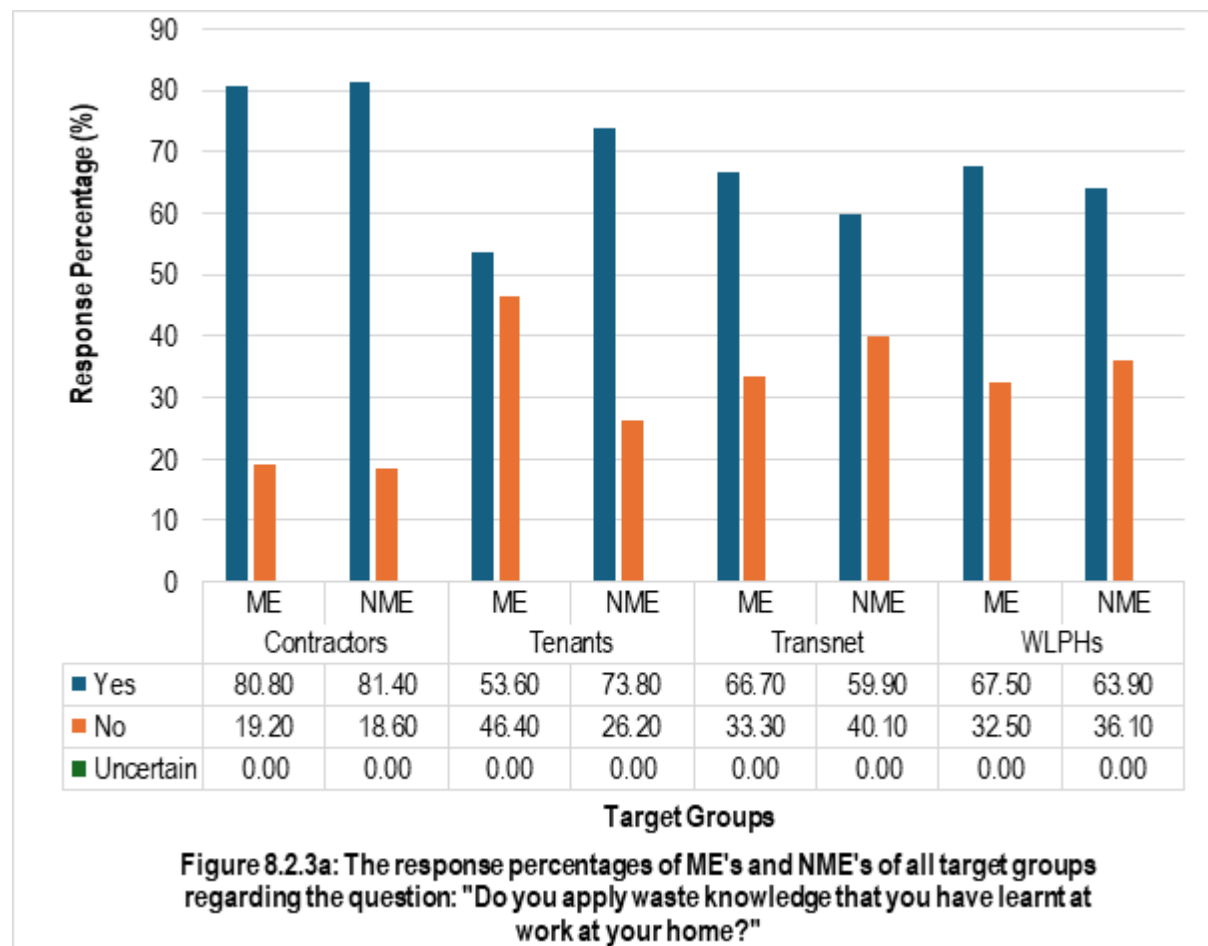
The NME’s and ME’s overwhelmingly chose the options of “always” (80.3% and 66.7 %, respectively) regarding the questions that deal with the issue of reporting the occurrence of oil spills on land. Much less of the ME’s (25.0 %) and NME’s (14.1 %) chose the option of “seldom”. Only a few ME’s and NME’s chose the option of “never” (8.3 % and 5.6 %) (Figure 8.2.2a).

The ME’s and NME’s mostly chose the options of “always” (74.6 % and 45.5 %, respectively) regarding the questions that deal with the issue of reporting the occurrence of oil spills in the water. Less of the ME’s and NME’s chose the option of “never” (36.4 % and 9.9 % respectively). Only a few of the ME’s (18.2 %) and NME’s (15.5 %) chose the option of “seldom” (Figure 8.2.2b).

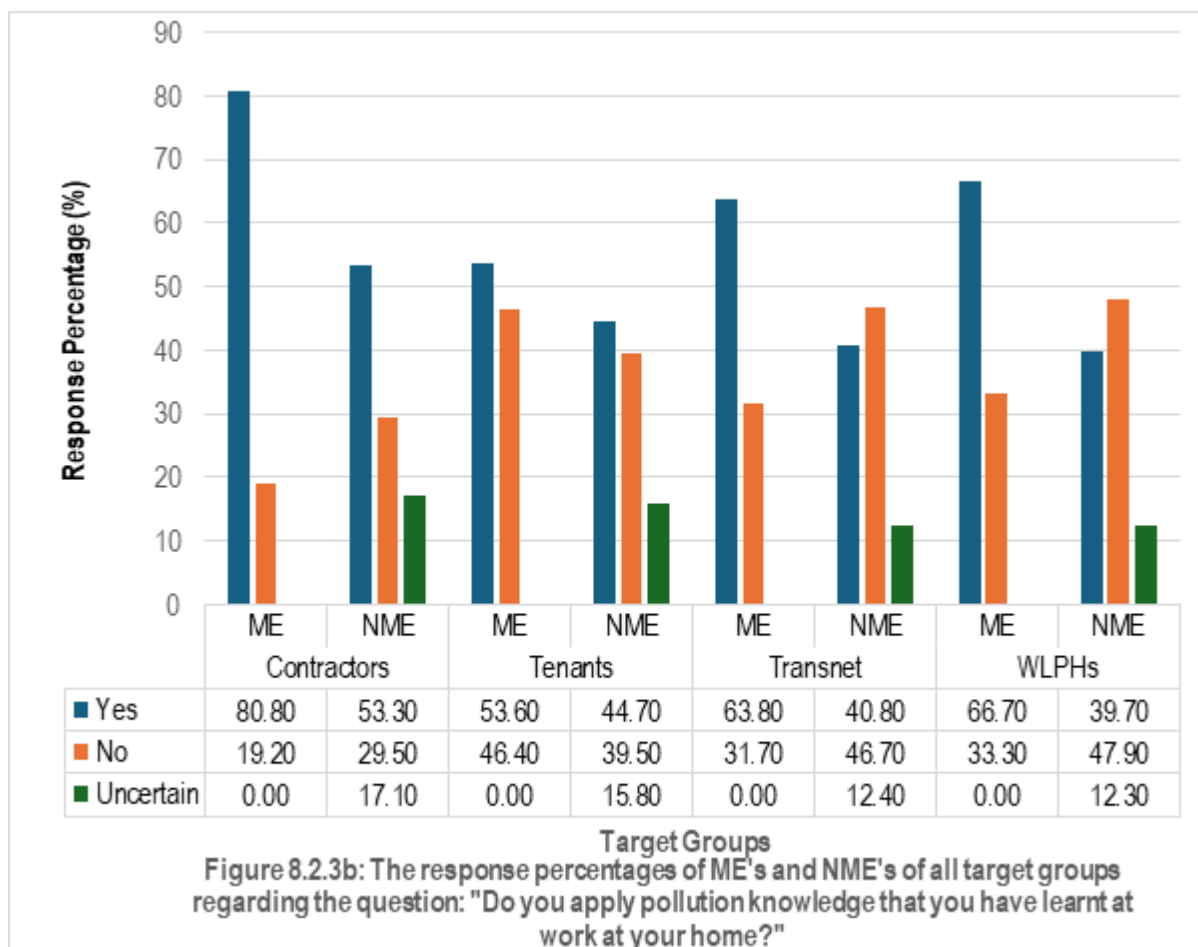
Most of the WLPH ME ‘s and NME’s indicated that the occurrences of oil spills on land and in water is “always” reported (Figures 8.2.2a; 8.2.2b). The oil spill contingency plan for the Port of Cape Town is made available to WLPH’s for alignment purposes

with their oil spill plans (TNPA, 2019a). The Environmental Officer / Specialist audit report of 2016 stipulated that most of the WLPH's that are not specialising in oil spills have service level agreements with those service providers that offer such services as well as the contacts of relevant authorities. These contacts are shared with the employees especially the truck drivers, so that during an oil spill emergency the necessary personnel and authorities may be informed for intervention according to roles and responsibility (TNPA, 2016). The port oil spill plan stipulates that all the oil spills incident must immediately be reported to the TNPA and to all relevant authorities. Early reporting of the oil spills has the advantage that early intervention can be initiated before significant environmental damage sets in (ITOPF (Ltd), 2014b). It is possible that the practice of reporting oil spills is influenced by the service level agreements (SLA) in place relevant contacts shared, as well as legal requirements (Lee, 2017).

8.2.3 Responses of ME's and NME's of all target groups regarding the question: Do you apply any waste and pollution knowledge that you have learnt at work at your home?



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the question: "Do you apply any waste knowledge that you have learnt at work to your home? ($P > 0.05$) (Figure 8.2.3a).



There were no statistical significant differences between the ME's and NME's for all the target groups with regards to the question: "Do you apply pollution knowledge that you have learnt at work to your home? ($P > 0.05$) (Figure 8.2.3b). The uncertainty of the response in this case may be due to their perception that pollution is not a relevant issue in their homes.

The contractor NME's and ME's overwhelmingly chose the option of "yes" (81.4 and 80.8 % respectively) for the question: "Do you apply any waste knowledge that you have learnt at work at your home?" Only 19.20 and 18.6 % of ME's and NME's chose the option of "no" (Figure 8.2.3a). The contractor ME's and NME's overwhelmingly chose the option of "yes" (80.8 % and 53.3 %, respectively) for the question: "Do you apply pollution knowledge that you have learnt at work to your home?" Less ME's and NME's (19.2 % and 29.5 %) chose the option of "no". Only some NME's (17.1 %) chose the "uncertain" option (Figure 8.2.3b).

The tenant ME's and NME's mostly chose the option of "yes" (73.8 % and 53.6% respectively) for the question: "Do you apply any waste knowledge that you have learnt at work at your home?" Less of the ME's (46.4%) and NME's (26.2 %) chose the option of "no" (Figure 8.2.3a). The tenant ME's and NME's mostly chose the option of "yes" (53.6 % and 44.7 %, respectively) for the question: "Do you apply pollution knowledge that you have learnt at work to your home?" Other ME's and NME's (46.4 % and 39.5 %) chose the option of "no", while only a few NME's (15.8 %) chose "uncertain" (Figure 8.2.3b).

The Transnet ME's and NME's mostly chose the option of "yes" (66.7% and 59.9 % respectively) for a question: "Do you apply any waste knowledge that you have learnt at work at your home?" Less of the NME's and ME's chose the option of "no" (40.1% and 33.3% respectively) (Figure 8.2.3a). For the most part Transnet ME's and NME's chose the option of "yes" (63.8 % and 40.8 %, respectively) for the question: "Do you apply pollution knowledge that you have learnt at work to your home?" Other ME's and NME's (31.7 % and 46.7 %) chose the option of "no", while a few NME's (12.4 %) chose "uncertain" (Figure 8.2.3b).

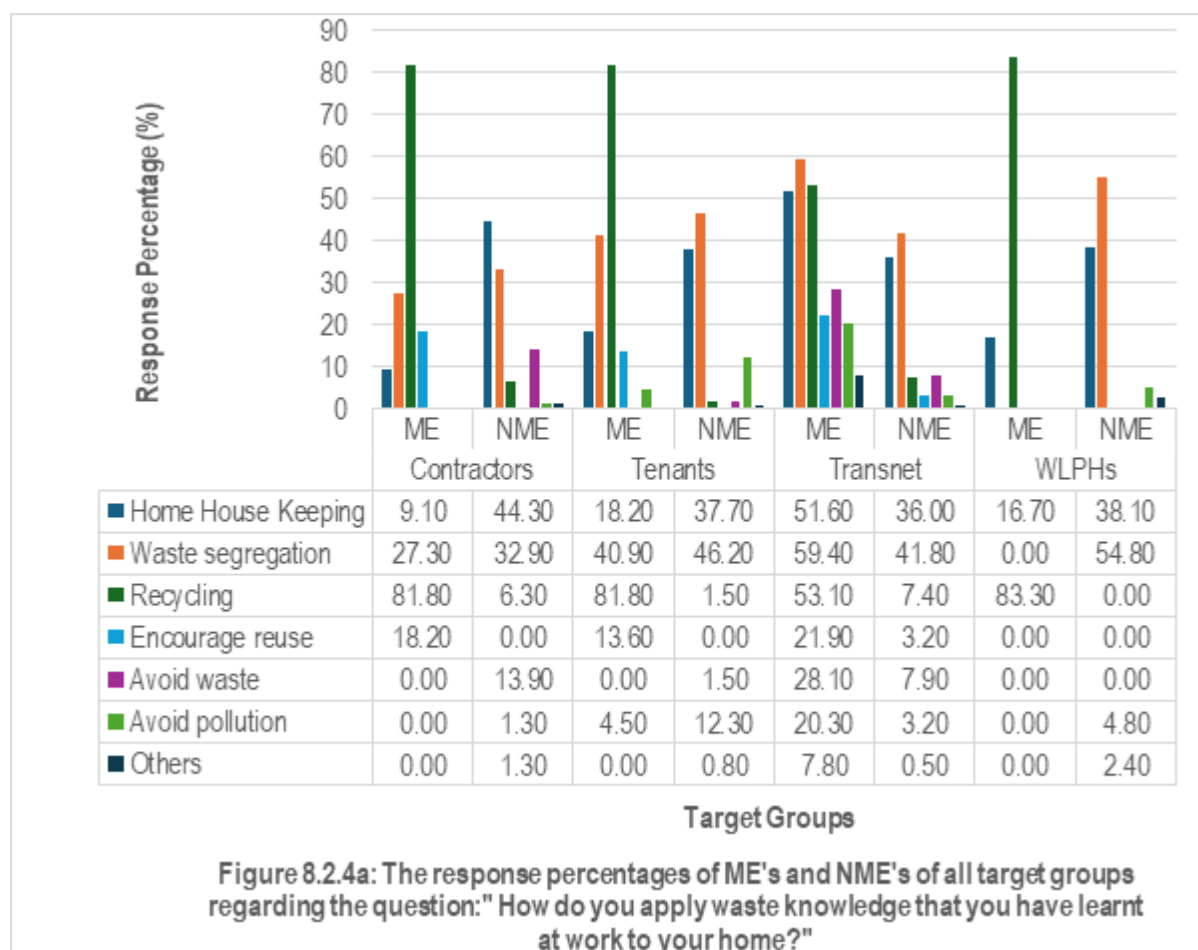
The WLPH ME's and NME's mostly chose the option of "yes" (67.5% and 63.9 % respectively) for the question: "Do you apply any waste knowledge that you have learnt at work at your home?" Some of the NME's and ME's (36.1 % and 32.5% respectively) chose the option of "no" (Figure 8.2.3a). For the most part WLPH ME's and NME's chose the option of "yes" (66.7 % and 39.7 %, respectively) for the question: "Do you apply pollution knowledge that you have learnt at work to your home?" Other ME's and NME's (33.3 % and 47.9 %) chose the option of "no". Only some NME's (12.3 %) chose "uncertain" (Figure 8.2.3b).

Most of the ME's and NME's of the contractors, tenants, Transnet and WLPH's indicated that they do apply waste and pollution knowledge that they learn at work in their respective homes. However, many respondents chose "no" for the pollution question. This may be due to their perception that pollution related matters are not relevant to their homes as much as waste is. In heading 3.2.8 (*Responses of Managerial Employees (ME's) and Non-Managerial Employees (NME's) on the statement: "There are awareness campaigns for waste"*), and in heading 3.2.3 - 6 (*The*

contractor, tenant, Transnet, WLPH's responses (ME's and NME's) concerning environmental awareness programmes), the response percentages of ME's and NME's of all the target groups revealed that there were awareness campaigns for waste and pollution management at the workplace for contractors, tenants, Transnet and WLPH's. Furthermore, in headings 4.2.1 - 4 (*Contractor, Tenant, Transnet, WLPH's responses (ME's and NME's) concerning environmental training programmes*) and in Tables 4.2.1 & 4.2.2 (*Responses of managerial employees (ME's) from all the target groups regarding environmental training programmes offered to non-managerial employees (NME's)*) & (*Responses of non-managerial employees (NME's) from all the target groups regarding environmental training programmes offered to them*), it was found that environmental training programme was offered to employees of all the target groups. Awareness campaigns and environmental training programmes that were offered to employees may have, amongst other factors, influenced ME's and NME's of all the target groups to put into practice what they have learnt at work at their respective homes. Bélanger (2003) argued that in providing environmental education, awareness and training it may be considered as empowering individuals with knowledge, and practical tools for positive change to be mindful in approaching the environment. Gadenne *et al.* (2009) stated that improvement in environmental (including waste and pollution management) practices is influenced by several factors, such as legislation, environmental activism, institutions that grant financial assistance, the service providers (in this case WLPH's) themselves, as well as employers' and employees' attitude in providing and accepting environmental awareness and training at the workplace. Environmental knowledge can often be seen in environmental practice of individuals. In a study conducted by Law *et al.* (2017) it is stipulated that where environmental education, awareness, and training was provided to the employees at the workplace they gained knowledge that changed their environmental practice. A positive conduct towards the environment was the result. Lamm *et al.* (2013) argued that employees that are encouraged and motivated at their workplace on environmental issues, continue to uphold lessons received into practice. It is thus possible that the waste and pollution knowledge received at work through awareness and training programmes has influenced employees in such a way that it affected their waste and pollution practice at home.

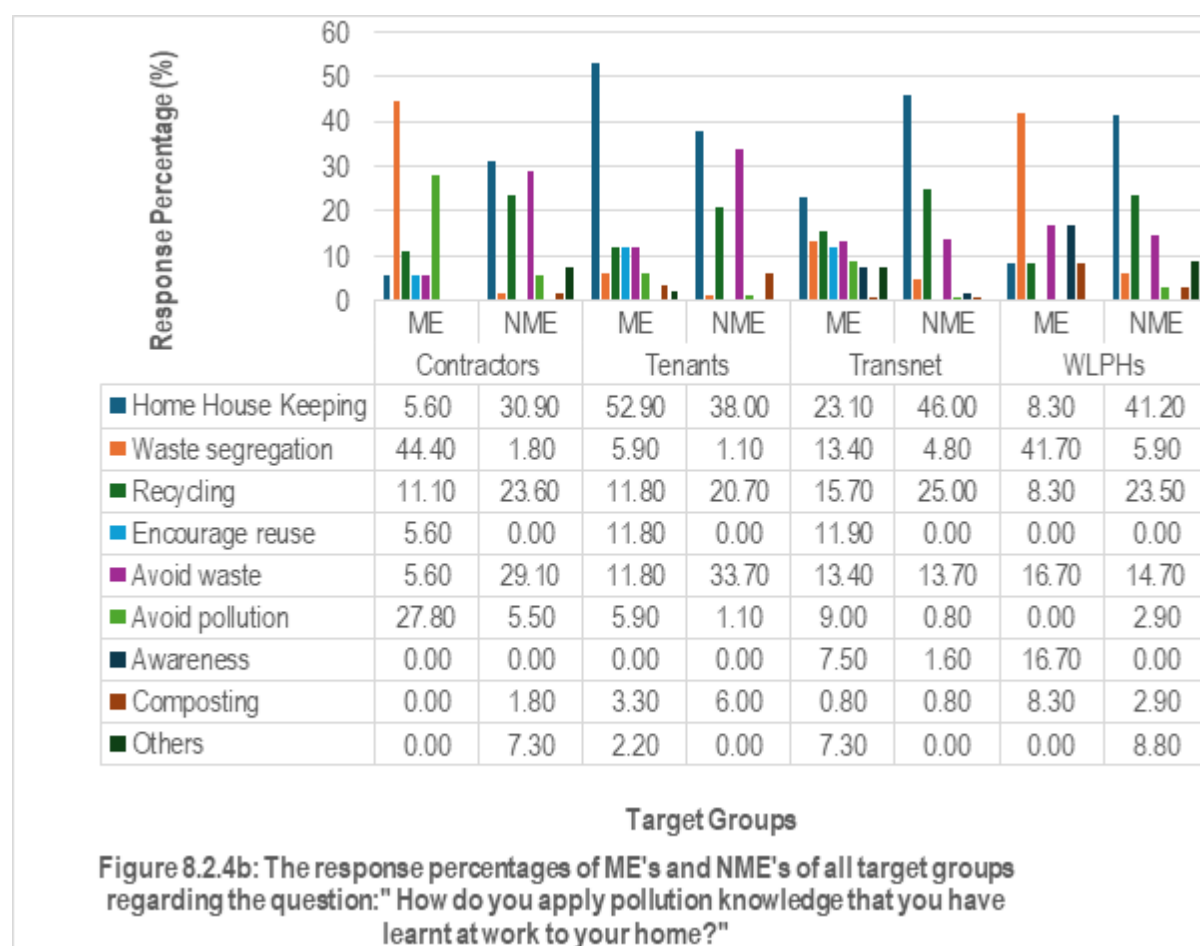
The housekeeping practice at home may be primarily positioned to values of propriety and cleanliness, however there may be possibility of conditions of environmental sustainability, which interfere in the manner in which the practices are conducted (such as water use and energy consideration) and the use of the material in their fulfilment (cleaning products that are eco-friendly) (Schatzki, 1996; 2002).

8.2.4. Responses of ME's and NME's of all target groups regarding the question: How do you apply waste and pollution knowledge that you have learnt at work to your home?



ME's and NME's responded to this question if they indicated "yes" for the previous question. There were statistical significant differences between the ME's and NME's for all the target groups with regards to the question: "How do you apply waste knowledge that you have learnt at work to your home?" ($P < 0.05$) (Figure 8.2.4a).

Respondents could indicate more than one practices, hence the percentages do not add to 100%.



ME's and NME's responded to this question if they indicated "yes" for the previous question. There were statistical significant differences between the ME's and NME's for all the target groups with regards to the question: "How do you apply pollution knowledge that you have learnt at work to your home?" $P < 0.05$ (Figure 8.2.4b). Respondents could indicate more than one practices, hence the percentages do not add to 100%.

In terms of applying waste knowledge, most of the contractor ME's (81.8%) indicated that the practice "recycling" at home, while most NME's (44,3%) indicated that they practice good "house-keeping" at home (Fig 8.2.4b). Several other practices were indicated to a lesser degree by respondents, including reuse and avoidance of waste

and pollution. Some respondents indicated that they use appropriate waste for compost (Fig 8.2.4a & b). Some other good waste and pollution practices were also indicated by respondents (Fig 8.2.4a & b).

In awareness, heading 3.2.1.3 (*Comparison in responses between the ME's and NME's with regards to the question: think about waste, what comes to mind?*), the majority of ME's by nature of their organizational functions must manage. It was indicated that litter was foremost in their thoughts when thinking about the issues related to pollution and waste because litter is a problem in the port environment that needs to be managed. The reason for the NME's indicating port clean-ups as the most prominent thought when thinking of waste may be because they are the ones that must conduct port clean-up operations, as a special effort, when waste becomes a problem in the Port of Cape Town. The concepts of litter and port clean-ups are obviously closely related to each other in the context of waste, linking the most prominent responses of the ME's and NME 's. Encouraging and educating people in waste matters result in a positive impact to their practice (Neat Street, 2017; Keep Australia Beautiful, 2016). In addition, Ali *et al.* (2012), argued that a lack of awareness is one of the major problems that prevent the management and implementation of good housekeeping. Barr (2007) and Koefoed & Buckley (2008) indicated that a lack of knowledge influences the practice in managing waste.

Furthermore, in heading 3.2.4.1 (*Waste and oil spill related awareness for contractors*) it is indicated that the ME's and/or supervisors conduct daily short briefing meetings before operations commence. The purpose, amongst others, is to raise awareness about particular SHE matters, such as waste and oil spill concerns. These meetings are called green area meetings. During these green area meetings NME's are made aware of the waste to be cleaned at the end of the shift. One of the NME representatives is required to conduct weekly SHE housekeeping inspections to ensure that waste and oil spill issues do not become problematic. Should it happen in the inspection that housekeeping is found to be poor with unnecessary waste and oil spills, action needs to be taken. The required action to remove waste and oil spills should be signed off by the supervisor (one of the ME's) when completed. Based on the findings of the inspection, appropriate awareness programmes will be implemented. The inspection report should be signed off by the relevant ME or

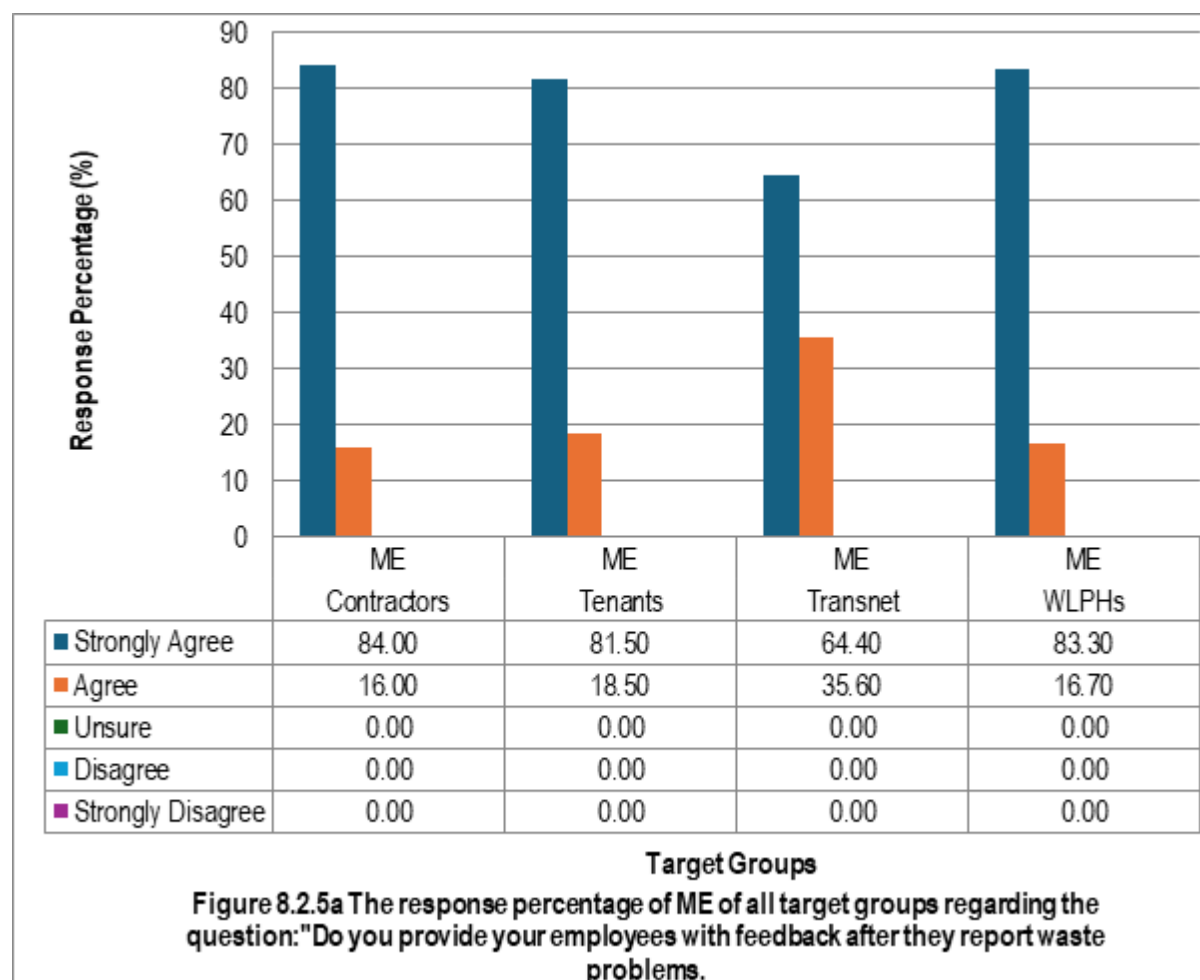
supervisor (Appendix B7). SHE housekeeping inspections are used as a tool to make the employees more aware of waste and oil spill problems and how it should be dealt with. These interventions may have also contributed to the high levels of waste and oil spill training and awareness programmes, as reflected in the response percentages (Table 4.2.1 - 2; Table 3.2.5 - 6). Most researchers agree that a workplace is a rich environment for individuals to learn and put received lessons into practice (Hager, 1998; Beckett & Hager, 2002; Manuti *et al.*, 2015) even at home. It is possible that the green area meetings, SHE housekeeping inspections and the operational experience of handling waste and oil spills influenced the response percentages. The ME's and NME's, being aware and knowledgeable of their roles in managing and participating in clean-ups and SHE inspections, might have been positively influenced in their response with regards to practicing good housekeeping at home.

In heading 7.2.2 (*Responses of ME's and NME's of all target groups regarding the statement: "There is separation of waste at the source"*) the majority of the NME's and fewer of the ME's indicated that there is separation of waste at the source. A similar pattern was observed in figure 8.2.4a where most NME's and fewer ME's indicated that they segregate waste at home (Figure 8.2.4a). Valkenburg *et al.* (2008) argued that waste separation is among one of the best practical methods that is effective in waste management. It could be possible that the ME's and NME's separation of waste at source might have influenced their waste segregation practice at home and most probably seeing the benefit of such a practice.

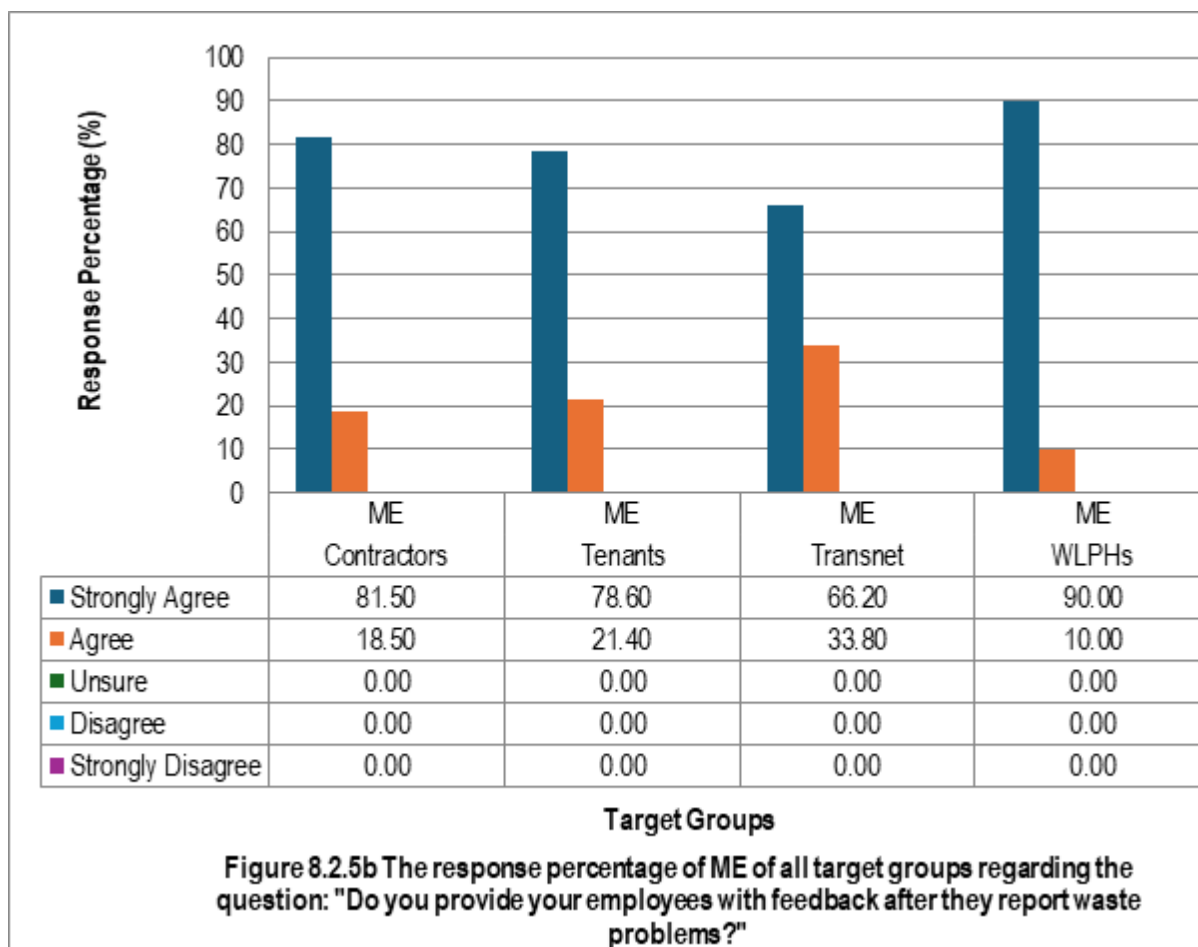
In heading 3.2.10 (*Responses of managerial employees (ME's) and non-managerial employees (NME's) from all the target groups regarding their degree of agreement or disagreement on the statement: "Recycling is encouraged at the workplace"*) it was found that there were high response percentages of all target groups indicating that recycling is encouraged at the workplace. Additionally, in heading 3.2.11 (*Response of managerial employees (ME's) and non-managerial employees (NME's) of all the target groups on the statement: "There is financial opportunity in recycling waste"*) the majority of respondents of all the target groups agreed that there were financial opportunities in recycling waste. Furthermore, the oversight annual report of 2016 indicated that training related to recycling was provided to employees (TNPA, 2016). Goh *et al.* (2017) argued that their research has proven that when individuals or a

certain group of people are made aware and encouraged of a certain practice to follow, change in practice is more often noticed in the implementation of such practice. Practice as far as recycling (du Toit *et al.*, 2017). It is possible that the encouragement, financial opportunities, and training at work might have influenced the recycling practice of port users at home. It can be deduced that government would like to see more implementation and practice of waste minimisation, reuse and recycling in industries and communities. Implementation of knowledge acquired at work at one's home can contribute to various Sustainable Development Goals (SDGs). These include amongst others, "no poverty" (SDG 1), "decent work and economic growth" (SDG 8) "industry, innovation and infrastructure" (SDG 9), "responsible consumption and production" (SDG 12) and "partnerships for goals" (SDG 17).

8.2.5 Responses of ME's of all target groups regarding questions on whether they provide feedback to their employees after they report waste and pollution problems



There were no statistical significant differences between the ME's of all the target groups with regards to the question: "Do you provide your employees with feedback after they report waste problems?" ($P > 0.05$) (Figure 8.2.5a).



There were no statistical significant differences between the ME's of all the target groups with regards to the question: "Do you provide feedback to your employees for reporting pollution problems?" $P > 0.05$ (Figure 8.2.5b).

The contractor ME's only chose the options of "strongly agree" and "agree" (84.0 % and 16.0 %, respectively) for the question: "Do you provide your employees with feedback after they report waste problems?" (Figure 8.2.5a). The contractor ME's only chose the options of "strongly agree" and "agree" (81.1 % and 18.5 %, respectively) for the question: "Do you provide your employees with feedback after they report pollution problems?" (Figure 8.2.5b).

The tenant ME's only chose the options of "strongly agree" and "agree" (81.5 % and 18.5 %, respectively) for the question: "Do you provide your employees with feedback after they report waste problems?" (Figure 8.2.5a). The tenant ME's only chose the options of "strongly agree" and "agree" (76.6 % and 21.4 %, respectively) for the

question: “Do you provide your employees with feedback after they report pollution problems?” (Figure 8.2.5b).

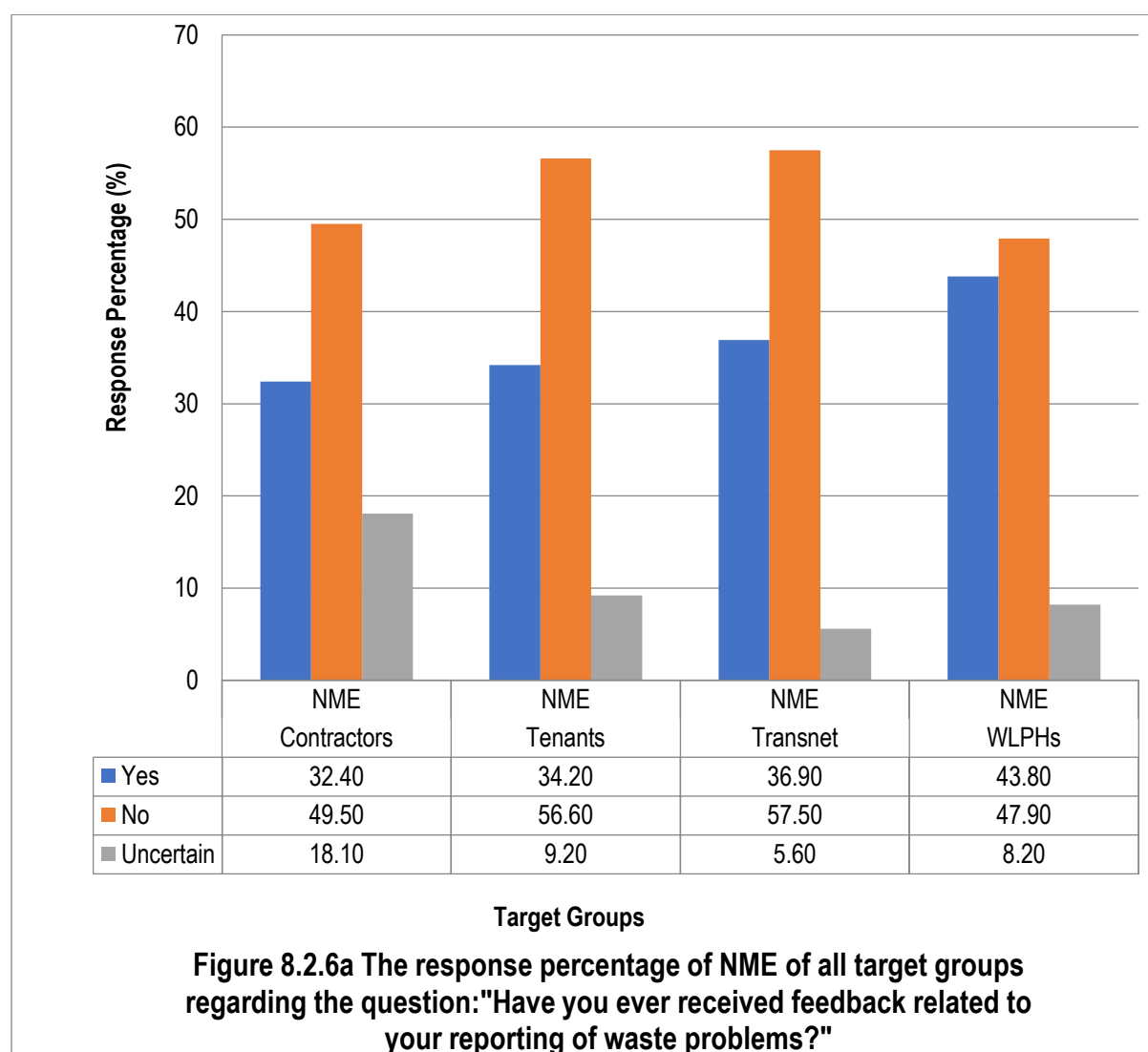
The Transnet ME’s only chose the options of “strongly agree” and “agree” (64.4 % and 35.6 % respectively) for the question: “Do you provide your employees with feedback after they report waste problems?” (Figure 8.2.5a). The Transnet ME’s only chose the options of “strongly agree” and “agree” (66.2 % and 33.8 % respectively) for the question: “Do you provide your employees with feedback after they report pollution problems?” (Figure 8.2.5b).

The WLPH ME’s only chose the options of “strongly agree” and “agree” (83.3 % and 16.7 %, respectively) for the question: “Do you provide your employees with feedback after they report waste problems?” (Figure 8.2.5a). The WLPH ME’s only chose the options of “strongly agree” and “agree” (90.0 % and 10.0 %, respectively) for the question: “Do you provide your employees with feedback after they report pollution problems?” (Figure 8.2.5b).

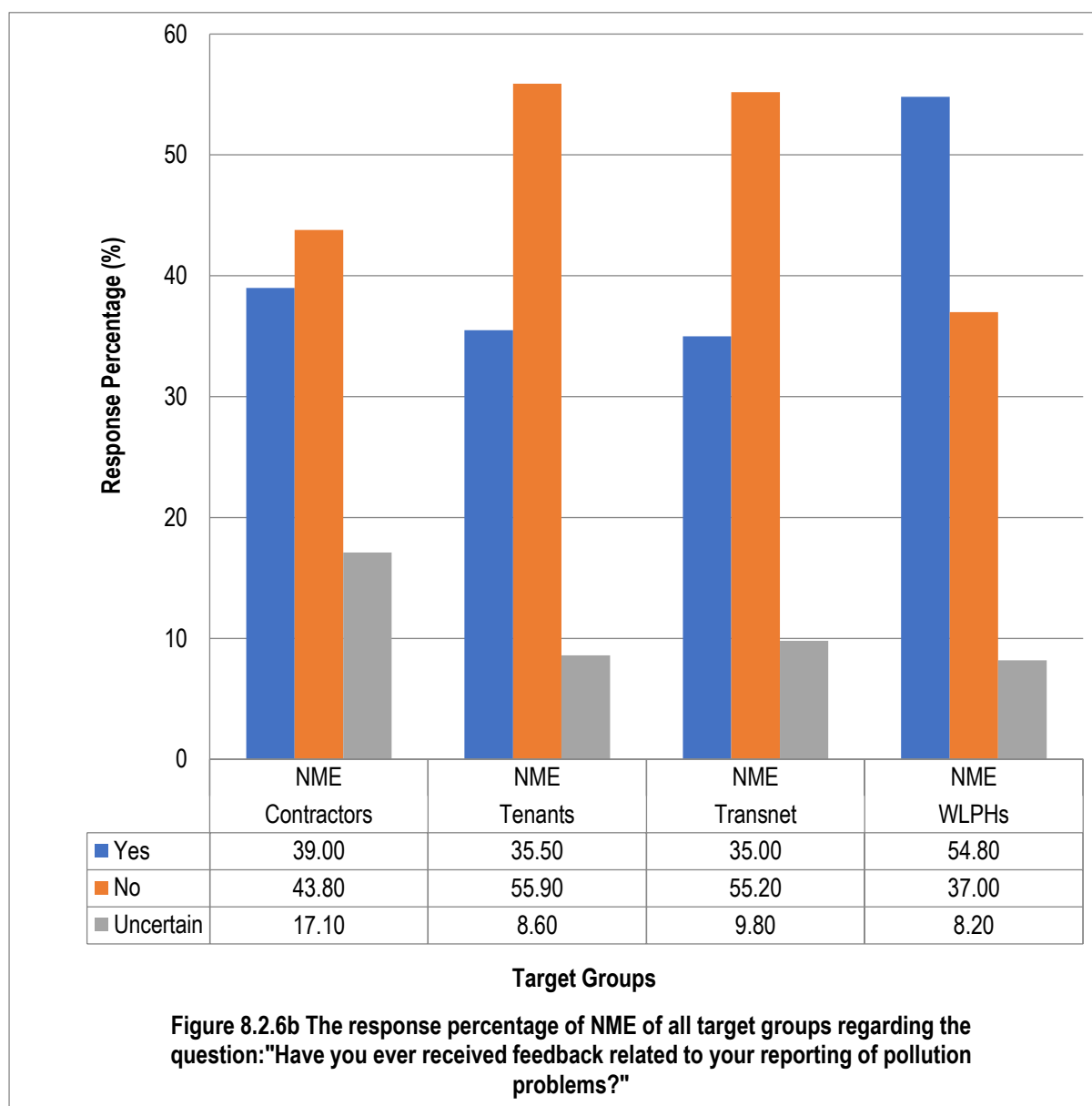
All the ME respondents of all the target groups indicated that they give feedback to their employees after they report waste and pollution problems (Figure 8.2.5a&b). For all the operations that are undertaken in the Port of Cape Town, it is compulsory to indicate and submit the name(s) of appointed, competent, and responsible managers for the successful and the safe completion of all the work to be carried out by an organisation, as required by Section 8 (1) of the Construction Regulations of 2014 (Republic of South Africa, 2014). Among other duties of the appointed responsible manager, as per Section 8 (1), (s)/he is to establish and maintain effective communication and a consultative process to ensure that all relevant employees receive information continuously in relation to all safety, health and environment issues (hazards, risks and mitigation measures, leading practices, incidents and lessons learnt, reported waste and pollution issues, etc). Also, to ensure that feedback is provided as soon as possible in relation to the matters and/or concerns raised (Republic of South Africa, 2014; Transnet SOC Ltd, 2017c). Feedback has potential for continuous improvement (Duijm *et al.*, 2008; Rahimi, 1995; Zhang *et al.*, 2022). In heading 5.2.7 (*Responses of ME’s and NME’s of all target groups regarding the statement: “I am informed of the environmental legislations”*), the ME’s all the target

groups indicated that they were informed of the environmental legislations. Furthermore, in heading 3.2.3 (*The contractors' responses (ME's and NME') concerning environmental awareness programmes*) it was indicated that any port user must submit the SHEP (Safety Health and Environmental Plan) file that is in accordance with the law (Republic of South Africa, 2017) and the required procedures of Transnet (Melato & Jacobs-Mohajane, 2014; Transnet SOC Ltd, 2017a) to operate in the Port of Cape Town. It is possible that the legislation and Transnet procedures has positively affected the practice and consequently the responses of all the ME's with regards to providing feedback to their employees regarding reported problems of waste and pollution. In addition, other scholars (Stringer, 2010; Yun *et al.*, 2013; Jiménez *et al.*, 2017; Patel *et al.*, 2019) found that feedback is beneficial and contributes to a positive change in environmental practices. Dogan *et al.* (2014) argued that providing feedback on environmental issues has a potential to change the environmental practice of individuals. Thus, providing feedback can play an important role to improve environmental practices and conditions. To further emphasise this point, Abrahamse *et al.* (2005) found that ignorance on environmental issues might be the result of not getting feedback or not being made aware of those practices or actions that might be harmful for the environment.

8.2.6 Responses of NME's of all target groups regarding questions on whether they receive feedback after they reported waste and pollution problems



There were no statistical significant differences between the NME's of all the target groups with regards to the question: "Have you ever received feedback related to your reporting of waste problems?" ($P > 0.05$) (Figure 8.2.6a).



There were no statistical significant differences between the NME's of all the target groups with regards to the question posed to them: "Have you ever received feedback related to your reporting of pollution problems?" ($P > 0.05$) (Figure 8.2.6b).

The majority of the contractor NME's (49.5 %) chose the option of "no" for the question: "Have you ever received feedback related to your reporting of waste problems?" . Less of the NME's chose the option of "yes" (32.4 %). 18.1 % chose the "uncertain" option (Figure 8.2.6a). The majority of the contractor NME's (43.8 %) chose the option of "no" for the question: Have you ever received feedback related to your reporting of pollution

problems?”. Fewer of the NME’s chose the option of “yes”, while (39.0 %) 17.1 % chose “uncertain” (Figure 8.2.6b).

Most tenant NME’s (56.6 %) chose the option of “no” for the question: “Have you ever received feedback related to your reporting of waste problems?”. Other NME’s chose the option of “yes” (34.2 %), while 9.2 % chose “uncertain” (Figure 8.2.6a). Most tenant NME’s (55.9 %) chose the option of “no” for the question: Have you ever received feedback related to your reporting of pollution problems?”. Less of the NME’s chose the options of “yes” (35.5 %), while 8.6 % chose “uncertain” (Figure 8.2.6b).

57.5 % of Transnet NME’s chose the option of “no” for the question: “Have you ever received feedback related to your reporting of waste problems?”. Less of the NME’s chose the option of “yes” (36.9 %). Only 5.6 % chose “uncertain” (Figure 8.2.6a). Most Transnet NME’s (55.2 %) chose the option of “no” for the question: Have you ever received feedback related to your reporting of pollution problems?”. Other NME’s chose the option of “yes” (35.0 %). Only 9.8 % chose “uncertain” (Figure 8.2.6b).

The majority of the WLPH NME’s (47.9 %) chose the option of “no” for the question: “Have you ever received feedback related to your reporting of waste problems?”. Other NME’s chose the option of “yes” (43.8 %), while only 8.2 % chose “uncertain” (Figure 8.2.6a). The majority of the WLPH NME’s chose the option of “yes” (54.8 %) for the question: Have you ever received feedback related to your reporting of pollution problems?”. Fewer NME’s (37.0 %) chose the option of “no”. Only 8.2 % chose “uncertain” (Figure 8.2.6b).

Except for the WLPH NME’s (regarding pollution reporting) most NME’s of all the target groups indicated that they do not receive feedback after they report waste and pollution problems. This contrasts with the ME’s that overwhelmingly indicated that they provide feedback to their employees after reporting waste and pollution problems (see heading 8.2.5 (*“Responses of ME’s of all target groups regarding questions on whether they provide feedback to their employees after they report waste and pollution problems”*)). It has been shown that providing feedback on environmental issues is more beneficial than not providing any feedback to people (Dogan *et al.*, 2014).

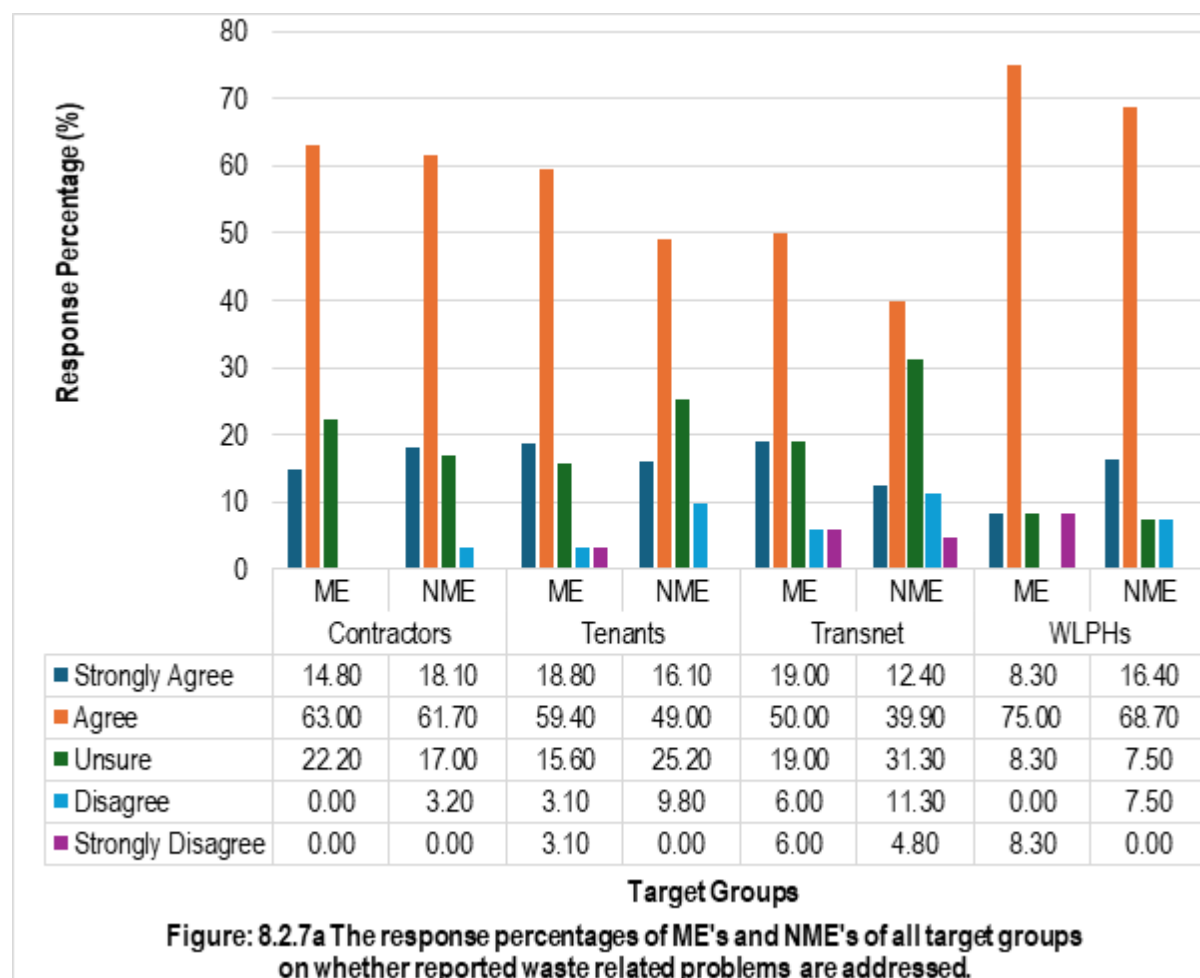
In the health and safety specification guidelines of Transnet SOC Ltd (2017a), that include environmental issues, it states that there should be a management review of all the operational activities of the port users in their organisations at least once in a quarter. The supervisors and the SHE representatives are required to provide all reported matters of waste and pollution to the EO and/or SHEQ Coordinator. All necessary reports should be provided to the SHEQ coordinator. During the SHE quarterly meetings, feedback is provided to all the employees (Republic of South Africa, 1993 & 1998; DCD Dorbyl Marine Cape Town (Pty) Ltd, 1995a). It was observed in the audits conducted by the ES of the TNPA that not all the reported matters were reflecting in the SHE quarterly meetings of tenants and WLPH's (TNPA, 2019b).

The EO or ES of Transnet normally provide feedback to the supervisors of the department from where the complaint came from. Then the supervisor of a target group organisation would communicate with their employees or SHE representatives in their green area meetings (TNPA, 2020). Not all the complaint communications go via EO and/or ES in the Port of Cape Town. In some other instances the TNPA pollution control team supervisors receive the calls directly for their attention (TNPA, 2015a). As a result, it is possible that the EO and/or ES might not be aware of certain reported waste or pollution incidences due to some cases being reported to the pollution control team supervisors. This may have contributed to the contrast in responses from the ME's and NME's with regards to feedback of waste or pollution incidences reported because those ME's responsible for feedback may not be aware of all reported incidences.

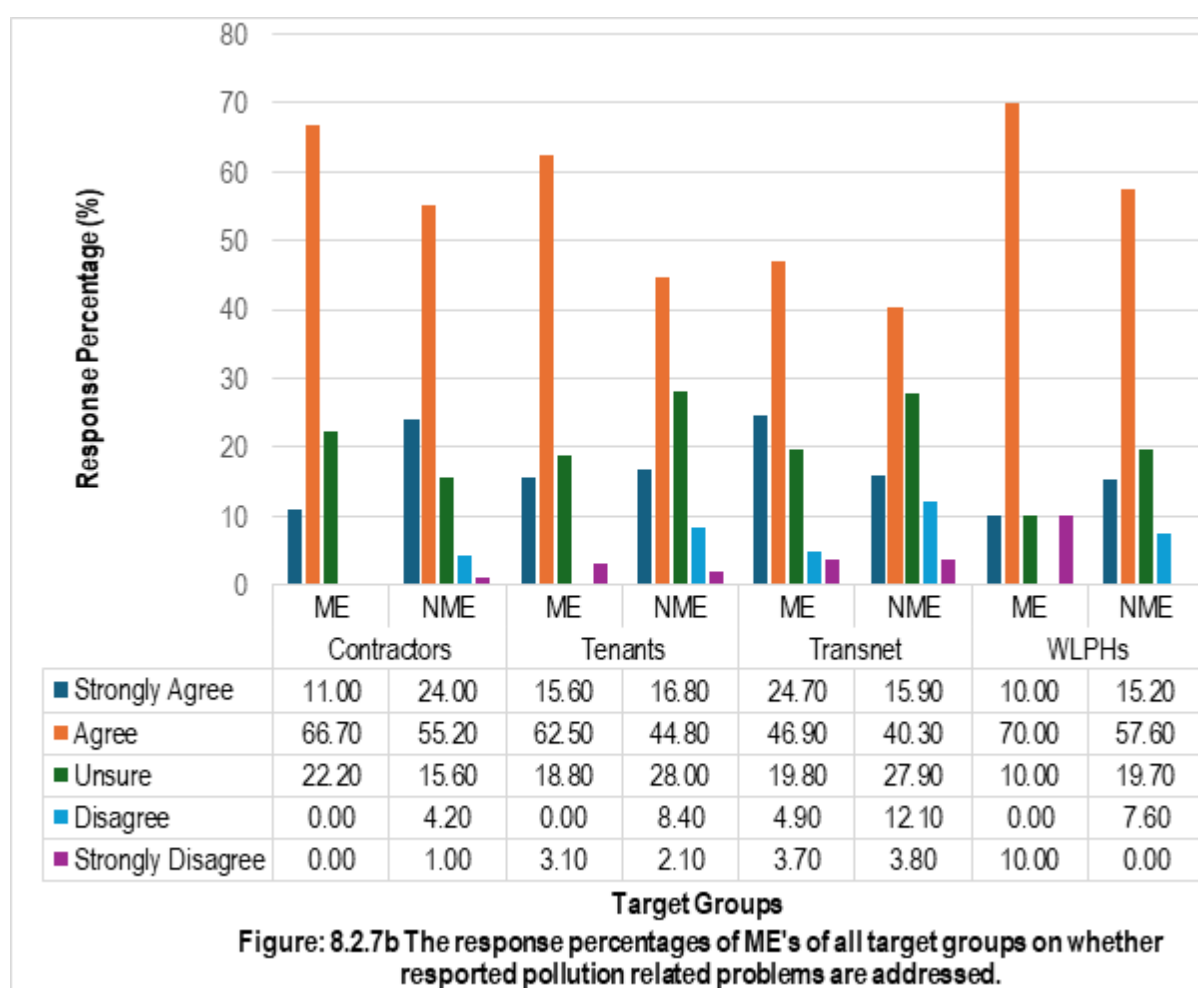
It has been discovered during an audit (TNPA, 2018a; GES, 2014) that some calls related to waste and pollution are being made to port control as to an emergency phone number to report anything within the port premises, since they operate for 24hrs. There seems to be several avenues of reporting that is used that do not link up with each other in the same organisation. Consequently, there are chances of a breakdown in communication. It is then not surprising to have a contrast between ME's and NME's for not receiving the feedback compared to ME's claiming to provide feedback, one of the findings of an internal audit indicated that there was no central complaint register to record all the complains in one document (TNPA, 2022a).

Therefore, the line of communication was not constant. It can be concluded that the feedback mechanism can be improved in order for the information to reach all employees.

8.2.7 Responses of ME's and NME's of all target groups on whether reported waste and pollution related problems are addressed



There were no statistical significant differences between the ME's and NME's of all the target groups with regards to the statements: [for ME's] "After employees report waste related problems, those matters are addressed", and [for NME's] "After reporting, the waste problems are addressed" ($P > 0.05$) (Figure 8.2.7a).



There were no statistical significant differences between the ME's and NME's of all the target groups with regards to the statements: [for ME's] "After employees report pollution related problems, they are addressed", and [for NME's] "After reporting, the pollution problems are addressed" ($P > 0.05$) (Figure 8.2.7b).

The contractor ME's and NME's overwhelmingly chose the option of "agree" (63.0 and 61.7%, respectively) for the statement: "After employees report waste related problems, those matters are addressed". Other ME's and NME's chose "strongly agree" (14.8 and 18.1%, respectively), while others (22.2 % and 17.0 %) chose the option of "unsure" (Figure 8.2.7a). Contractor ME's and NME's mostly chose the option of "agree" (66.7 % and 55.2 %, respectively) for the statement: "After employees report pollution related problems, those matters are addressed". Some others chose "strongly agree" (11.1 % and 24.0 %, respectively), while some ME's and NME's (22.2 % and 15.6 %) chose the option of "unsure" (Figure 8.2.7b).

Tenant ME's and NME's mostly chose the option of "agree" (59.4 % and 49.0 %, respectively) for the statement: "After employees report waste related problems, those matters are addressed". Less of the ME's and NME's chose "strongly agree" (18.8 % and 16.1 %, respectively) and "unsure" (15.6 % and 25.2 %) (Figure 8.2.7a). Tenant ME's and NME's mostly chose the option of "agree" (62.5 % and 44.8 %, respectively) for the statement: "After employees report pollution related problems, those matters are addressed". Less chose "strongly agree" (15.6 % and 16.8 %, respectively) and "unsure" (18.8 % and 28.0 %) (Figure 8.2.7b).

Transnet ME's and NME's mostly chose the option of "agree" (50.0 % and 39.9 %, respectively) for the statement: "After employees report waste related problems, those matters are addressed". Others chose "strongly agree" (19.0 % and 12.40%, respectively) and "unsure" (19.0 % and 31.3 %) (Figure 8.2.7a). Transnet ME's and NME's mostly chose the option of "agree" (46.9 % and 40.3 %, respectively) for the statement: "After employees report pollution related problems, those matters are addressed". Some chose "strongly agree" (24.7 % and 15.9 %, respectively), while others chose "unsure" (19.8 % and 27.9 %) (Figure 8.2.7b).

WLPH ME's and NME's overwhelmingly chose the option of "agree" (75.0 % and 68.7 %, respectively) for the statement: "After employees report waste related problems, those matters are addressed". Others chose "strongly agree" (8.3 % and 16.4 %, respectively) (Figure 8.2.7a). WLPH ME's and NME's overwhelmingly chose the option of "agree" (70.0 % and 57.6 %, respectively) for the statement: "After employees report pollution related problems, those matters are addressed". Some other ME's and NME's chose "strongly agree" (10.0 % and 15.2 %, respectively) and "unsure" (10.0 % and 19.7 %, respectively) (Figure 8.2.7b).

Most of the ME's and NME's of all the target groups felt that waste and pollution related problems that were reported are addressed. Potential hazards or risks are thus attended to after they have been reported. After reporting waste or pollution problems the relevant responsible person acts and address the issues. In a case where there was an incident the SHE representative and the supervisor of the reporting organisation is part of the investigation. All necessary reports are provided to the

reporting organisation's SHEQ coordinator (DCD Dorbyl Marine Cape Town (Pty) Ltd, 1995a&c; Republic of South Africa, 1998a).

All waste and pollution related matters must be communicated to the TNPA SHE department. Then the EO or ES of the SHE department will liaise with the relevant department by involving the supervisors and SHE representative of that section where such matters should be given proper attention to be resolved. Should it require a service provider (WLPH), the pollution control team, or the harbour master department to be involved, the EO and/or ES will do so (Republic of South Africa, 2008, 2005a & 1998; TNPA, 2015b & 2020; Appendix G1). A reason why the responses in Figures 8.2.7a and 8.2.7b were so positive may be due to the morning toolbox talks, as well as the monthly or quarterly SHE committee meetings where reported waste and pollution problems are discussed. This is to indicate whether the issues were addressed or are still being addressed. These meeting are a requirement as per the standard operating procedures and the legislation. The constitution of the Republic of South Africa (RSA) promotes an environment that is free from harm to its citizen as a constitutional right (Republic of South Africa, 1996a). (Republic of South Africa, 1993; Nichol *et al.*, 2017). Baloyi and Masinga (2010) stated that the government of South Africa has introduced a compliance arm called Environmental Management Inspectors (EMIs). Their task is to ensure that they monitor compliance in line with the relevant environmental legislation. This team can do inspections unannounced. Stringent penalties of up to 10 million rand or imprisonment can result from non-compliance. These are consequences should any organisation or individual be found in violation of environmental legislations (Republic of South Africa, 1998a & 2008a). This may have also contributed to the positive picture that waste and pollution problems are indeed addressed (Figures 8.2.7a and 8.2.7b).

The interview responses from the Solid Waste Management Department of the City of Cape Town indicated the following: -

“the port of Cape Town is an accredited waste generator and has been assessed by the City of Cape Town and was accredited for proper management of waste at the ports”.

“The solid waste department is always engaged on solid waste issues and the advice is given to ensure compliance and clarity”.

“Engagement is on a compliance level and will assist where necessary to control environmental disaster”.

The port authority requires this type of permit as part of returnable documents as part of the application process to obtain Transnet waste permit licenses as per the National Ports Act (Republic of South Africa, 2005).

Chapter 9

CONCLUSION AND RECOMMENDATIONS

9.1 CONCLUSIONS PER CHAPTER

9.1.1 Awareness

The objectives of this chapter were:

- To ascertain the level of awareness of the Port of Cape Town users, especially in waste and pollution matters.
- To identify the potential barriers and opportunities for the port as it pertains to waste and pollution management.
- To assess and evaluate the roles of relevant stakeholders (City of Cape Town, Western Cape Government, National Government) other than port users in waste and pollution management in the port.

The port users are generally aware of the port environmental conditions in relation to waste and pollution issues due to offered awareness programmes at the workplace by all the target groups in their respective organisations. Furthermore, Transnet also offers awareness programme to employees. For most of the port users littering and port clean-ups were important issues that came to mind regarding waste and pollution. Waste and pollution were interchangeably used and seemed to mean more or less the same thing to the majority of ME's and NME's (Tables 3.2.3 – 4; Figure 3.2.2; Figures 3.2.12a – d). The port users were also aware of the illegal dumping taking place in the Port of Cape Town, which has a potential negative impact on the port environment. It therefore seems as if Transnet, as landlord, does not have a clear management strategy to address littering and the awareness of its impact in the port. Although the Transnet Integrated Management System has the intention to reduce the environmental footprint of business activities at the port, the financial moratorium is hindering this system from being effectively implemented. An example of this is the port clean-up operations. When port clean-up operations were initiated, there seemed to be support for this programme from all target groups. However, as time went on port users started to withdraw from these initiatives (TNPA, 2015a & 2020a). Because the required awareness programmes cannot take place as it is supposed to, it has a negative effect on the port as there is a need to save costs. As long as the budget and

resources are not available, environmental awareness programmes cannot fully achieve its objectives. Despite these barriers of budget and resources, it is evident there are awareness campaigns for waste management at the workplace (Figure 3.3.14). Furthermore, a positive response was revealed concerning recycling that is encouraged at the workplace by all port users. All the target groups (contractors, tenants, Transnet and WLPH's) in the present study indicated through their response percentages an agreement or strong agreement to the statement: "Recycling is encouraged at the workplace" (Figure 3.2.15). This positive response is due to the interventions put in place to encourage recycling in the workplace. As a result of awareness of recycling, opportunities were also identified in recycling that can have financial benefits (Figure 3.2.16). In their interviews local government officials emphasised the importance of awareness of recycling and a need for both industries and the community to be involved in implementing recycling initiatives. Furthermore, the results of the study suggest that there seem to be greater awareness in terms of recycling at the workplace and its financial benefits. Awareness of recycling and associated initiatives contribute directly to achieving the objectives of the SDGs.

The question, "do you collaborate with outside stakeholders concerning environmental awareness programmes" (Figure 3.2.13), the "yes" and "no" responses did not differ from each other significantly within the same target group. The uncertainty of the "don't know" responses was considered to be closer to a "no" response than a "yes" response and was seen as a sign of a certain level of ignorance (Figure 3.2.8). The different port users time period of activity in the port, in conjunction with a variety of portfolio responsibilities may possibly affect decisions of having collaboration with outside stakeholders to offer awareness programmes to employees during the operational activities. Certain ME's may not specifically deal with outside stakeholders on awareness programmes, hence the relatively high levels of "don't know" responses from ME's. WLPH's had the highest positive responses followed by Transnet in terms of collaboration with outside stakeholders. Both these target groups collaborate more with local authorities as an opportunity to favour their operational activities and requirements. In order to successfully manage environmental challenges collaboration in awareness with local government is crucial (Koontz *et al.*, 2010; Seuring & Gold, 2013). The interviews revealed a support of awareness programmes provided by the local government to all port users, in various ways. The government level respondents

feel that collaboration on awareness programmes is not sufficient and that there is still much that must be done especially on awareness in environmental compliance. It can be deduced that collaboration on awareness programmes with outside stakeholders is an opportunity to improve in waste and pollution management matters in the port. This is in line with the intention of SDG 17 that deals with partnerships as a mechanism to achieve the objectives of the sustainable development goals.

9.1.2 Training

The objectives of this chapter were:

- to determine the current practices of port users regarding waste and pollution management as far as environmental training programmes are concerned.
- to determine the potential barriers or opportunities as it pertains to waste and pollution as far as environmental training programmes are concerned.
- to determine the role of the relevant stakeholders (authorities) other than port users in the waste and pollution management in the port as far as environmental training programmes are concerned.
- to review the documents of Transnet in relation to environmental training programmes.

This study revealed an alignment in relation to the environmental training programmes offered by the employers to their employees. It is evident from the results that NME's from all target groups receive environmental training programmes. The ME's and NME's generally indicated that the training programmes aim to protect the environment (Tables 4.2.1-2; Figure 4.2.1 - 10; Figure 4.4). The following were found to have influenced the training programmes: the contractor management procedures, the SHEP files training requirements, Transnet provided induction training programmes, SHEIM training manual booklets, the implementation and training requirements of EMP's, random inspection by DoL, periodic audit handover procedures of work sites, the penalty retention fee, formal training conducted by accredited service providers, certificate of competency, water quality monitoring programme, and sharing of information with port users. Among the target groups Transnet was found to have more employees (by percentage) that indicated that they did not receive environmental training programmes. This is a concerning finding. The

Transnet financial moratorium seems to be one of the root causes for the apparent lack of environmental training programmes that aim to protect the environment.

It was found that the environmental section in the TNPA SHEIM training manual has been inadequate for many years (TNPA, 2015a). This was identified by means of document review. The environmental section, including pollution and waste, among others, were found to be inadequate. This provides an opportunity to expand the environmental component in the TNPA induction training programme offerings. Furthermore, it was discovered, by means of observations, that the contractors occasionally subcontract work. This means that the RS is likely not to evaluate the subcontractor SHEP file, neither provide induction training to its employees. It is thus possible that the lack of a complete environmental component in the induction training programme of TNPA, and subcontractors not being inducted by the RS, might influence the environmental challenges that are found in the port. This could explain why a certain percentage of respondents indicated that they did not receive training related to environmental issues.

The document review revealed that most current tenants already gained access to the port some years ago, and maybe, even without any strict rules with regards to environmental training programmes for their employees. Some tenants have 5 to 10-year lease agreements with the TNPA, while others may have 20 to 25-year lease agreements. Therefore, those existing lease agreements may not have strict requirements on environmental training programmes, due to it not being a requirement at the time those lease agreements were signed.

For ME's and NME's of all the target groups air pollution training programmes received the lowest response percentages compared to other training options (Table 4.2.1; Table 4.2.2). The City of Cape Town has an air quality monitoring station in the port, approximately 1 km from the Synchrolift dry dock, where vessel cutting usually takes place. However, at the time of data collection for this study, no air quality monitoring took place. An inventory done by uMoya-NILU in 2016 found that air pollution is a problem in the Port of Cape Town (uMoya-NILU, 2016a). Further investigations by uMoya-NILU (2016b) revealed that there were no working air emissions monitoring stations to measure air pollutants from the operational activities in the dry docks of the

Port of Cape Town. This violates the Occupational Health and Safety Act (no. 85 of 1993) (Republic of South Africa, 1993) that states that any person who enters a workplace premises must be made aware of the risk of such an environment. In the absence of air quality monitoring in the port, Transnet is not able to make port users aware of air quality risks. Furthermore, this Act requires that training be provided to individuals working in such an environment (Republic of South Africa, 1993). The fact that the response percentages from all target groups of ME's and NME's are the lowest compared to other training options is an indication that air pollution training is seen as a lower priority in the Port of Cape Town. Therefore, air quality monitoring must be established in the port to measure and manage possible unacceptable air quality that may be caused by activities in the port.

TNPA ranked third in terms of response percentages for ME's and NME's compared to the other target groups in terms of environmental training programmes. Furthermore, Transnet was found to have low response percentage for ME's and NME's (Table 4.2.1 – 2; Figure 4.2.1 - 2). A contributing factor is the TNPA financial moratorium. Due to this moratorium external consultants cannot be used for training purposes. The document review revealed that the financial moratorium contradicts the intention of the SHEQ policy. This policy indicates that all employees should have equal opportunities for training and development. Additionally, the company has embarked on a new holistic Transnet Integrated Management Approach (TIMA) (Transnet SOC Ltd, 2017c; Appendix B14). In order to effectively implement TIMA, training programmes should include safety, health and environmental aspects. However, the financial moratorium is hindering TIMA from being effectively implemented because the required training cannot take place. Inadequate training opportunities for employees create significant challenges that may compromise the progress to achieve SDG 4 (Quality Education) (Fleg *et al.*, 2022; Zickafoose *et al.*, 2024). This lack of training opportunities may also lead to a situation where other SDGs are not achieved, such as SDG 12 (responsible consumption and production). Training initiatives are very important because without access to it, employees are impacted negatively and may be unable to upgrade their competencies in relation to waste to pollution management. It may result in a retardation of personal development of employees and the organisation's capacity to remain competitive and innovative. In order to address these challenges, it is very crucial for the organisations to (i)

implement awareness and training programmes regularly, tailored to maritime employees' roles and career progression. (ii) to put in place platforms for learning to provide flexible and accessible training opportunities. (iii) Make provision for a budget allocated for development to ensure training initiatives of sustainability (iv) Monitoring and evaluation of training outcomes to measure impact and continuously improve programmes (v) Lastly, to encourage a culture of lifelong learning by recognising, and rewarding skill development efforts towards the end of every financial year.

The environmental service for the entire port is shared among two Environmental Specialists (ES). One of them deals with waste and pollution matters. Due to a shortage of human resources (including the vacant Pollution Control Officer position) the ES responsible for waste and pollution matters are often unable to effectively deal with waste and pollution related Transnet provided training.

Most contractors and tenants chose the “no” option for the question that dealt with collaboration with outside stakeholders (Figure 4.3). Some respondents chose the “don’t know” response, and this may be interpreted as a negative response. If there was collaboration with outside stakeholders, it would have been known to the respondents, and they would have replied in the positive. The study revealed that the influence behind this negative response for contractors and tenants were as follows: short periods of operational activities in the port, especially amongst contractors, results in less priority being given to collaboration with outside stakeholders, probably due to time constraints to complete operational activities.

There is partial collaboration with outside stakeholders as far as environmental training across all the port users, however, in the case of Transnet and WLPs this collaboration is more effective (Figure 4.3). The following were found to have influenced the positive responses from Transnet and WLPs in terms of collaboration with outside stakeholders on environmental training: the Port of Cape Town hosted a port management training programme in collaboration with the International Ocean Institute (IOI); further, a collaboration programme was held between Transnet, the South African Maritime Safety Authority (SAMSA) and the Department of Transport (DoT) where training workshops were provided on environmental protection procedures and new regulation requirements, amongst others (SAMSA, 2019); the

TNPA pollution control team collaborated with outside stakeholders on oil spill contingency plan programmes and associated training programmes (TNPA, 2019a); the Port of Cape Town collaborates with international ports on the advancement of the knowledge of its ME's on matters related to environmental training programmes (Transnet SOC Ltd, 2015a; Havenga *et al.*, 2017; DEA, 2018a). Due to the legislative requirements to get waste licence permits, WLPH companies attend workshops or seminars offered by different levels government that deals with environmental and waste management policies, strategies and legislation. There are also workshops conducted for inputs from industries for improvement in environmental and waste management compliance related to changes in legislation and improvement in this sector (DEFF, 2020a; DEA, 2014/5). The different levels of government provide opportunities which may be used by port users to improve their environmental training programmes and understanding their requirements (Figure 4.3; Heading 4.2.5.1). However, it should be noted that there is a need for continuous improvement as far as environmental training is concerned in the context of the port.

9.1.3 Knowledge

The objectives of this chapter were:

- to determine the extent of the knowledge of port users towards the environment in the Port of Cape Town. Note; The purpose of this part of the data collection is not to test the knowledge of the employees but to enquire about their opinion on particular to waste and pollution matters.
- to engage relevant local government departments to understand the role they are playing in support of environmental knowledge at the Port of Cape Town.

The majority of the port users are knowledgeable concerning the availability of the different waste reception facilities (e.g. skips, bins and slop tanks), which must be in place before any work commence at the operational areas in the port (Figure 5.2.1). The responses from the port users suggested that the waste reception facilities, according to their knowledge, were enough and conveniently located (Figures 5.2.2 - 3). Many of the port user responses also suggested that waste reception facilities were appropriately labelled for the types of waste, and consequently as a result the waste was disposed correctly (Figures 5.2.4 - 5). This is good since properly labelled waste

reception facilities seem to promote waste segregation and correct disposal (Kingsley, 2012). However, about 40% of Transnet respondents indicated that waste reception facilities were not labelled for type of waste. This is further supported by those respondents that indicated that waste was not disposed correctly (Figures 5.2.4 - 5). This can potentially lead to waste not being segregated and not properly managed (Hawkins, 2006). This contradicting finding could be due to waste reception facilities not being properly labelled for type of waste in certain parts of the port, which may lead to incorrect disposal of waste. It can be deduced that the correct labelling of waste receptacles can lead to the correct disposal of waste. Thus, knowledge of waste receptacle labelling and waste disposal can lead to proper implementation of waste management practices.

Most of the ME's and NME's know to whom to report waste and pollution problems they encounter (Figures 5.2.6a & b). This high level of responses on to whom reporting should be done can be ascribed to a variety of reasons: the SHE induction programmes, implementation of EMP's with assigned responsibilities, printed notices, SHE monthly meetings, departmental waste and pollution champions, the pollution control team, and appointed Environmental Officers and / or Specialists. The interviews revealed that local government also plays a role in ensuring that they have dedicated personnel for information enquiries and reporting purposes of waste and pollution related issues.

Generally, the ME's and NME's of all target groups were informed of environmental legislations (Figure 5.2.7). The environmental awareness and training programmes, as well as collaboration programmes were contributing factors to their knowledge in environmental legislation. However, a gap was identified where an absence of environment components in the Port of Cape Town EXCO meetings were identified. If matters of an environmental nature are not discussed and dealt with by the Port of Cape Town top management it creates a potential risk to the port environment, the port's functioning and compliance with environmental legal requirements. Interview responses from local government suggests that there is a lack of knowledge concerning relevant legal requirements by port users. There seems to be a disconnect between what local government thinks of port user's environmental legislation

knowledge and what the port users think they know with regards to environmental legislations. This gap needs to be addressed.

According to the responses of ME's of all the target groups there is, in general, knowledge of IWMPs and EMPs that are in place for operational activities in the port. However, there is room for improvement for port users to be made aware because not all employees have knowledge of IWMPs and EMPs (Figures 5.2.8 - 9). There is a gap in training and awareness of EMPs and IWMPs that needs to be addressed by Transnet because every port user must know about it (GES, 2014; Chand Environmental Consultants, 2019; TNPA, 2020a). The study revealed that employees can gain knowledge through the experience of operational port services as well as in training and awareness programmes.

9.1.4 Attitude

The objectives of this chapter were:

- to ascertain the level of environmental attitude of the Port of Cape Town users, especially in waste and pollution matters.
- to engage relevant local government departments to understand the role they are playing in support of a positive environmental attitude at the Port of Cape Town.

The findings revealed that ME's and NME's of all target groups felt that waste and pollution is everyone's problem in the port environment. Furthermore, the majority of the respondents felt that waste and pollution outside of their working areas is their problem to attend to (Figure 6.2.1a – b; Figure 6.2.2a – b). The contributing factors to this positive attitude can be attributed to acknowledging the responsibility of waste and pollution, accountability, commitment of management, employees' participation in port litter clean-up operations, knowledge of environmental legislation, environmental compliance, Transnet contract procedures, submission of SHEP files, policies, IWMPs, EMPs, housekeeping inspection registers, reduction of waste generation, as well as awareness and training programmes in waste and pollution matters. However,

some respondents exhibited a negative attitude towards waste and pollution matters. This could be because they lacked the knowledge and experiences that were listed above. It can be concluded that learning and participation, thus knowledge and practice, can be regarded as contributing factors to influence environmental attitude in a positive way.

The responses of ME's and NME's of all target groups revealed positive responses, in that environmental incidence of waste and pollution is taken seriously in the Port of Cape Town (Figure 6.2.3a - b). The following were found to have influenced the positive attitude to this matter: signed agreement documents between the port users and Transnet, consequence management procedures that are implemented by Transnet for failing to adhere to the terms and conditions of lease agreements, Transnet policies, the Transnet pollution control team, service level agreements, the submission of incident and/or accident management plans, incident procedures, knowledge and compliance of environmental legislations, as well as awareness and training programmes. The local government interviews revealed related views to other port users, stressing the importance of lease agreement reviews and inclusive of pollution incident management.

A certain group of the ME's and NME's had a negative attitude in terms of waste and pollution incidences being taken seriously at the port. It could be that this group did not attend induction training programme. As a result, they are not aware of the relevant environmental procedures, roles and responsibilities. The local government officials also stressed the importance of procedures that must be adhered to.

It seems as if environmental incidences are given the desired attention in terms of being reported and addressed appropriately (Figures 6.2.3a - b, 6.2.4 and 6.2.6). Failure to report, and none adherence to legislations and procedures, may result in government agencies implementing consequences on port management and/or users to ensure that reported incidences are properly addressed. The interview responses from local government officials were aligned with some of the other findings of the study, particularly those related to tenants. It was found that some tenants did not have EMP's and IWMP's in place. The government offers workshops on environmental legislation and other related environmental subjects to all interested organisations to

ensure that they are updated on the requirements that may affect their operations. These government interventions may have contributed to the positive attitude towards the port environment by the majority of port users. Some ME and NME respondents from the different target groups had a negative attitude in terms of waste and pollution incidences being reported and addressed at the Port of Cape Town. Maybe this is a group of employees that did not attend induction training programmes as it was shown by the training related responses. As a result, they are not aware of the relevant environmental procedures, and their roles and responsibilities. The local government officials also indicated the importance of the protocols and procedures that must be adhered to, in order to ensure compliance on reporting and addressing waste and pollution incidences.

The ME's of the different target groups mostly indicated that they receive assistance from relevant governmental bodies (Figure 6.2.5). Quarterly meetings are held between TNPA, Transnet Port Terminals (TPT), the South African Maritime Safety Authority (SAMSA), and the South African Association of Ship Operators and Agents (SAASOA). These are governmental bodies and agencies with platforms that assist port users to address their concerns that requires government's intervention. These governmental institutions provide training workshops that focus on environmental protection procedures and new regulation requirements (SAMSA, 2020/19). Furthermore, port users participate in INTERPOL's Pollution Crime Working Group (PCWG), the Environmental Compliance and Enforcement Committee (ECEC), and the industrial waste management forum. These groups work towards to intensify their efforts to fight pollution (DEA, 2018a; DEA, 2018b). Ports are being inspected on several occasions to keep a check on the activities of port users. These are platforms where information is shared on best practices. The responses from local government officials show a positive attitude towards waste and pollution related matters in the port. They seem to provide assistance when required by port users. There seem to be good cooperation and collaboration between port users and governmental bodies, in terms of assistance from these governmental bodies to port users.

However, some of the ME's indicated that there is no assistance received from the relevant governmental bodies. This is especially noticeable from the tenants' responses (Figure 6.2.5). In the interviews conducted with governmental officials, they

raised a concern about tenant management in the Port of Cape Town. There is a need to further investigate the gaps between the Port of Cape Town tenants, in particular, and governmental bodies to strengthen the cooperation and assistance relationship between these two groups.

9.1.5 Perception

The objectives of this chapter were:

- to determine the perceptions of port users regarding waste and pollution management.
- to identify the potential barriers and opportunities for the port as it pertains to waste and pollution management.
- to review relevant documents of Transnet to discuss the environmental perception in the Port of Cape Town.
- to engage relevant local government departments to understand their perception regarding waste and pollution at the Port of Cape Town.

The ME's and NME's were found to be divided in their perception whether the port is clean or not (Figure 7.2.1). The negative responses with regards to whether the port is clean may have been influenced by initial site visits and walkabouts (before work activities of contractors or tenants commence), where a work site may have been experienced in an unacceptable state (Appendix F2). This could be perceived as a culture of littering and ineffective waste management in certain parts of the port. Although the TNPA pollution control team will pay attention to such an area in the port before work activities commence in that area, a negative perception may have already been created about the cleanliness of the port.

However, many respondents of all the target groups perceived the port as clean. The differences in perception of the respondents may have been influenced by their own individual experiences of the port's environmental condition. Also, certain parts of the port may be more clean than other parts due to the variety of operational activities taking place in the port and different levels of adherences to good waste management practices. The study revealed that most of the employees that are directly responsible for the collection and management of waste in the port (especially the WLPH's) had a more positive perception of the cleanliness of the port.

A certain percentage of respondents were unsure where the port is clean or not. This may be ascribed to a situation of inconsistent cleanliness of the port. This may be due to certain parts of the port being clean, while other parts are not. Further, this may also be caused by port users not always practicing good waste management after their operational activities, i.e. some port users clean their work areas while others do not. Other complicating factors include the port pollution control vessel that is not always in a working condition, thus is not always able to clean up the port waters, when necessary (TNPA, 2021). Wind-blown litter in the port (and its water) originating from outside the port is also complicating matters in terms of the cleanliness of the port.

The majority of the ME's and NME's from all the target groups agree that waste is separated at the source (Figure 7.2.2). The contributing factors that led to the respondents' positive perception could be knowledge and application of relevant environmental legislation during operational activities, and the presence of waste reception facilities, which are clearly marked for the type of waste. This is very important because proper labelling of waste reception facilities promotes waste segregation (Saheed, 2017). Additionally, an internal waste compliance audit report indicated that certain areas in the port have good waste management practices, where waste separation was observed (TNPA, 2019d). The TNPA promotes the separation of waste at the source in its environmental risk framework strategy (TNPA, 2015a, b & f; TNPA, 2020a). Some of the respondents felt that waste is not separated at the source in the port. Audit reports have indicated that separation of waste did not take place in certain areas of the port (TNPA, 2008, 2019a, 2019d). This is aligned with the findings of this study. The Port of Cape Town were found to be non-compliant to the National Environmental Management: Waste Act (No. 58 of 2008) in certain parts of the port (Republic of South Africa, 2008a, TNPA, 2019d). This negative finding must thus be addressed by the TNPA and other port users to ensure that waste separation does take place throughout the entire port.

Most of the ME's and NME's agreed that there is enforcement of waste and pollution in the Port of Cape Town (Figure 7.2.3a & b). The following were contributing factors that may have influenced this positive perception of respondents: inspections conducted by SHE Representative employees and signed off by relevant personnel, random inspections by the DoL, pre- and post-operational inspections to check for

compliance by the Dock Master and the Lease Representative(s), compliance with the requirements of SHEP file process, roles and responsibilities of the employees, the authority of TNPA's Risk Specialist (RS) to stop any work that threatens safety, health and the environment on-site, oversight audits of the TNPA ES to enforce environmental regulations and legislation, as well as environmental monitoring, compliance and enforcement conducted by the Environmental Management Inspectors from DFFE Notices, fines and penalties are also issued for contraventions of environmental legislation (DEA, 2013/4; DFFE, 2019). These control measures, amongst others, can be seen as contributing factors that influenced the ME's and NME's positive perception regarding the enforcement of waste and pollution in the port.

Some of the ME's and NME's had a negative perception regarding enforcement of waste and pollution in the port (Figure 7.2.3a & b). In 2020 the Department of Forestry, Fisheries and Environment (DFFE) visited the Port of Cape Town and identified the Elliot Basin as a "dirty" site. The site was found with waste reception facilities overflowing. It is clear evidence that some parts of the port are not in an acceptable state (DEFF, 2020b). The compliance internal audit report of TNPA done in 2019, as it relates to the National Environmental Management: Waste Act, showed that some areas within the port's operational areas separated waste, while others did not (TNPA, 2019d). This finding corresponds with the present study (Figure 7.2.2). This experience in the port might have contributed to the negative perception of the certain ME's and NME's that there is no enforcement of waste and pollution in the port.

Most of the respondents from all the target groups perceived waste and pollution management as a problem in the port (Figures 7.2.4a - b). This is the case in spite of, amongst others, knowledge of environmental legislations, lease agreements requirements, environmental management plans, and environmental awareness. The study revealed that the port environment is perceived by certain respondents as unsightly (Figure 7.2.1, Figure 7.2.4a - b), and this can be due to unacceptable management of waste and pollution (Figures 7.2.4a - b). In certain areas of the port, for example the dry docks, grit blasting materials on the ground, waste that are not separated, waste reception facilities that are overflowing and not regularly removed, illegal dumping in open spaces, oil and chemical spills, dust in the truck staging areas,

litter that finds its way into the port via storm water and the Salt River, floats-sum in the water, as well as contaminated water and sediment, serve as support for the perception that waste and pollution management is a problem in the port (TNPA, 2020a; Appendix E2). Thus, there needs to be improvements made in the management of waste and pollution in the port.

A certain percentage of respondents held the perception that waste and pollution management is not a problem in the port (Figure 7.2.4a - b). This finding is supported by results that revealed that certain parts of the port can be considered as clean (Figure 7.2.1). Particular practices in the port can be seen as contributing factors that led to the perception of some respondents that waste and pollution management in the port is not a problem. These include: SHE inspections, discussions of the SHE inspection findings, and tool-box sessions that happen in the mornings before operational activities for that day start. Practices such as, the removal of full waste skips, the collection of float sum in the water, the management of oil and chemical spills, and the management of illegal dumping, could have contributed to the positive perception of waste and pollution management in the port. The local government also supported this finding by indicating that the port is well managed. However, local government also holds the view that more can be done to manage the impact of waste and pollution in the port.

In general, most ME's and NME's agreed that people get fines for waste and pollution offences in the port (Figures 7.2.5a and b). In 2020 an external legal compliance audit report stipulated areas of concern in relation to waste and pollution in different areas of the port for TNPA management to pay more attention to. Those areas were found to be likely to attract fines and penalties should the issues be ignored (AKA Risk Management Specialists cc, 2020). The Environmental Management Inspectors (EMI's) do environmental monitoring, compliance and enforcement throughout the country, including ports. Where there is contravention of the National Environmental Management Act, they issue a notice and hand the matter to the National Prosecution Authority (NPA) that issues fines and penalties (DEA, 2013/4). The relevant local government authorities, like SAMSA, DFFE, DoT, DoL visit ports for environmental inspections and issue fines, where necessary. It is possible that the port users might have received notices and fines or are at least aware of these consequences of failure

to comply with waste and pollution related legislation and regulations. Hence, the perception that fines are issued for waste and pollution offences in the port. Local government officials indicated that they regulate the port through the City's by-laws, and encourage compliance and is willing to assist, where necessary. This further reinforces the perception that waste and pollution offences are dealt with and managed by the relevant authorities. However, during this study on document review, no legislation could be found that gives TNPA, as the landlord, specific powers to issue fines related to waste and pollution matters; this includes the National Ports Act (No. 12 of 2005), although Section 11 requires the port to enforce environmental laws in order to protect the environment. These also include other unpromulgated environmental legislation related to ports (DoT, 2017; GEF-UNDP-IMO, 2009).

Generally, the ME's and NME's of all four target groups perceived the disposal of waste to be expensive (Figure 7.2.6). A major contributing factor to this perception is that the cost of waste disposal to the company forms part of the materials that are shared with the employees more often by the recycling companies (TNPA, 2015a & 2020a; Godfrey & Oelofse, 2017). Although certain costs are not disclosed due to confidentiality related to waste tenders (DEA, 2016). During awareness and training programme, this also serves as motivation to the employees to recycle waste (Figure 3.2.15) (Ado, 2019). However, an outdated IWMP (GES, 2014), and poor information sharing to port users in general regarding the IWMP (Figure 3.2.3 – 12; Figure 4.2.1 - 10; Table 3.2.5 – 6; Table 4.2.1 – 2) (TNPA, 2020a) may have contributed to some respondents being unsure with regards to the costs related to waste disposal.

In general, the respondents were positive across all target groups in their perception of the future of the port environment, compared to their past and present perceptions (Figures 7.2.7a, b, c). They have shown a positive and optimistic future outlook in terms of the port environment. There seems to have been a gradual improvement over time of SHE files, regular internal and external audits, as well as monitoring and enforcement, which led to the positive and optimistic future outlook in terms of the port environment. Government officials also added to this positive perception of the port environment by indicating that the port is well managed, although they felt that more

can be done to create environmental awareness and manage environmental impacts in the port.

9.1.6 Practices

The objectives of this chapter were:

- to ascertain the environmental practices by Port of Cape Town users, especially in waste and pollution matters.
- to engage the local government to determine the role they play to support environmental practices at the Port of Cape Town.

Port users showed higher levels of cautioning terms of environmental care in their operational activities in the port, as revealed in their responses (Figure 8.2.1). It is likely that environmental knowledge gained through awareness and training programmes, work experience and participation (in this case attitude), and the implementation of EMP's may have been instrumental to influence the practices of port users in a positive way. Interviews with local government officials revealed that they are also concerned about the protection and care of the environment in the port.

The housekeeping practice at home may be primarily positioned to values of propriety and cleanliness, however there may be possibility of conditions of environmental sustainability, which interfere in the manner in which the practices are conducted (such as water use and energy consideration) and the use of the material in their fulfilment (cleaning products that are eco-friendly) (Schatzki, 1996; 2002).

Environmental care was demonstrated in various ways in the practices in the port. This is evident in the high response percentages of ME's and NME's on the reporting of oil spills on land and in water (Figure 8.2.3a – b). In addition, the majority of the ME's and NME's indicated that they apply waste and pollution knowledge that they have learnt at work, at their homes as well (Figure 8.2.4a – b). The lessons learnt from work, which were practiced by the employees at home, were, for example, waste segregation, recycling and good housekeeping. These kinds of practices can be linked to increased awareness, training, knowledge and positive attitudes (Gerbrandt & Westman, 2020; Sabela-Rikhotso, 2022; Blake, 2024). The same link between awareness, training,

knowledge, attitude and practices can be deduced for the Port of Cape Town, which contributes across various SDG's (1, 8, 9 and 12) and the National Development Plan of South Africa.

The ME's claimed to provide feedback to NME's after waste and pollution problems were reported to them. However, a contradiction was observed on this issue when NME's were asked this question. The majority of the NME's revealed that ME's do not provide feedback (Figures 8.2.5a – b; Figures 8.2.6a – b). The reason for this contradiction could be that there are several avenues of reporting that is used in the port. These reporting avenues do not necessarily link up with each other (TNPA, 2020). Consequently, there is a possibility of a breakdown in communication between ME's and NME's. As much as there was this contradiction and apparent breakdown in communication between reporting NME's and ME's providing feedback, it seems as if reported waste and pollution problems were found to be addressed. However, the impact of not reporting back to the NME's may influence their attitude and perception negatively when it comes to future and consistent reporting of environmental incidences.

Most of the ME's and NME's of all the target groups felt that waste and pollution related problems that were reported are indeed addressed (Figure 8.2.7a – b). The influencing factors contributing to this positive result could, amongst others, include, actions taken by the relevant responsible parties, (i.e. SHE representative and the supervisor investigation team), communication to the SHEQ coordinator and department, the work of the pollution control team, the harbour master department's involvement, the morning toolbox meetings, the monthly or quarterly SHE committee meetings, as well as unannounced inspections from the various internal and external authorities- (DCD Dorbyl Marine Cape Town (Pty) Ltd, 1995a&c; Republic of South Africa, 1996a; Republic of South Africa, 1998a). The interview responses from local government officials revealed that the port is accredited for proper management of waste. Also, that local government engage the port on waste management issues and provides advice to ensure clarity and compliance with the National Ports Acts (Republic of South Africa, 2005).

9.2 GENERAL CONCLUSIONS

The port users are generally aware of the port environmental conditions with a view that littering and port clean-ups as critical issues that came to mind, with waste and pollution, which they often used interchangeably. This confusion may be attributed to waste and pollution being so closely linked and related to each other. Furthermore, these employees indicated a concern of the illegal dumping taking place in the port, which has a potential negative environmental impact. Although the Transnet Integrated Management System exist with the intention to reduce the environmental footprint of business activities at the port, the financial moratorium is constraining this system from being effectively implemented. This restriction has negatively affected the rollout of environmental awareness programmes and training initiatives, undermining the port's efforts to foster sustainable practices.

There is notable awareness from all the target groups in terms of recycling at the workplace (Figure 3.2.15) and the financial benefits thereof (Figure 3.2.16). The government officials emphasized that both industries and communities must be actively involved in recycling practices and implementation. Active participation by all role players directly contributes to achieving the SDG objectives.

In general, the majority of the ME's and NME's have been revealed to be aimed at training programmes aiming to protect the port environment and have been influenced by various factors. It was found that the environmental section, including waste and pollution, among others, were for many years inadequate in the TNPA SHEIM training manual. This provides an opportunity to expand the environmental component in the TNPA induction training programme offerings. Furthermore, it was discovered that the contractors occasionally subcontract work. As a result, the risk specialist (RS) is likely not to evaluate the subcontractor SHEP file, nor provide induction training to those employees. This had a negative impact on employees' responses related to environmental training issues. Air pollution training programmes were found to be given the lowest priority by all target groups.

In addition, there are two environmental specialists (ES) in the Port of Cape Town who are expected to deal with all environmental related issues of the port. However, it was

found that two ES's for the Port of Cape Town are inadequate to effectively perform all duties related to environmental issues.

For the most part, it was found that appropriate labelling of waste reception facilities for the type of waste promote waste segregation and correct disposal of waste. However, instances were found where labelling of waste reception facilities did not take place. Consequently, waste was not segregated and properly disposed of. Thus, knowledge of waste receptacle labelling and waste disposal can lead to proper implementation of waste management practices. It can be concluded that learning and participation, thus knowledge and practice, can be regarded as contributing factors to influence environmental attitude in a positive way. The study revealed that joint operational activities take place between relevant stakeholders for enforcement of waste, pollution and other environmental related issues. This was perceived positively, although some employees had a negative perception about enforcement in the port. A review of relevant documents revealed that no legislation could be found that gives TNPA, as the landlord, specific powers to issue fines related to waste and pollution matters; this includes the National Ports Act (No. 12 of 2005), although Section 11 requires the port to enforce environmental laws in order to protect the environment. These also include unpromulgated environmental legislation related to ports. This may limit TNPA in exercising its powers in terms of environmental enforcement.

In general, the respondents were positive across all target groups in their perception of the future of the port environment, compared to their past and present perceptions. They have shown a positive and optimistic future outlook in terms of the port environment. There seems to have been a gradual improvement over time of SHE files, regular internal and external audits, as well as monitoring and enforcement, which led to a positive and optimistic future outlook. Government officials also added to the positive perception of the port environment by indicating that the port is well managed, although they felt that more can be done to create environmental awareness and manage environmental impacts in the port.

The majority of the ME's and NME's showed a positive attitude in terms of taking environmental incidents seriously and it being addressed. However, a contradiction was observed between ME's claiming to provide feedback on environmental incidents,

while NME's differ from the position of the ME's on this matter. The reason for this contradiction was found to be the several avenues of reporting that is used in the port, which do not necessarily link up with each other. However, the impact of not reporting back to the NME's may influence their attitude and perception negatively when it comes to future and consistent reporting of environmental incidences.

The majority of the ME's and NME's showed a positive attitude in terms of taking environmental incidents seriously and it being addressed. However, a contradiction was observed between ME's and NME's in relation to environmental incidents feedback due to several avenues of reporting that is used in the port. However, the impact of not reporting back to the NME's may influence their attitude and perception negatively when it comes to future and consistent reporting of environmental incidences.

Port users showed relatively high levels of caution in terms of environmental care in their operational activities in the port. It is likely that environmental knowledge gained through awareness and training programmes, work experience and participation (linked to attitude) and the implementation of EMP's may have been instrumental to influence the practices of port users in a positive way. Local government officials are, however, concerned about the protection and care of the environment in the context of the port. Although the focus of the investigation was limited to the Port of Cape Town, the lessons learnt can be constructively applied to other ports in South Africa in relation to waste and pollution management for sustainable practice.

9.3 RECOMMENDATIONS

Environmentally related signage prohibiting, for example, illegal waste dumping should be installed across the port. Closed circuit cameras in the port can be used to help monitor illegal activities that negatively impact the environment and enforce proper waste and pollution management. Transnet, as landlord, should draft a clear management and implementation strategy to address littering and the awareness of the impact and the cost thereof in the port. An additional environmental component in the induction training programme of TNPA should be included.

It is crucial for the government and TNPA to initiate a strategy as an opportunity to improve collaboration on awareness and training programmes and other related environmental issues in the port that is inclusive in bringing on board all relevant stakeholders such as port users. This will further enable the goal to reach a positive and optimistic future outlook in terms of the port environment.

The Transnet executive managers should reconsider the implementation of the financial moratorium strategy, especially in relation to awareness and training programmes related to environmental matters in the port.

The Risk Specialist of the TNPA should evaluate the sub-contractor SHEP files and provide induction training to their employees.

It is important to ensure that all waste reception facilities that are deployed in the port are properly labelled for types of waste. This will facilitate efficient adherence to the 3R's of sustainable waste management.

The lack of legislative powers to issue environmental fines should be addressed to enable the TNPA to directly legally address environmental transgressions by port users.

It is recommended that the number of Environmental Specialists in the TNPA SHEQ department should be increased to enable this department to make a meaningful contribution to the auditing, assessment and promotion of environmental awareness and training programmes.

It is recommended that an air pollution training programme be given greater priority and provided to employees of all port users. An operational air quality monitoring stations should be installed in strategic positions on the premises of the port. The reports generated from the results of these monitoring stations should be shared with stakeholders and/or port users in order to comply with the requirements of Section 3 of the Occupational Health and Safety Act.

An online reporting system for waste and pollution incidences should be introduced where cases can be logged, monitored and closed off.

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APPENDICES

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