Semiformal waste management at the community level: A case study of employment opportunity creation in Cape Town, South Africa

Blair Nicholas Impson (IMPBLA001)

Supervisor – Dr Gina Ziervogel

African Climate and Development Initiative (ACDI)

Masters in Climate Science and Sustainable Development

Minor Dissertation

May 2024

Abstract

In order to effectively tackle the pressing matter of municipal solid waste management, particularly in developing countries, it is imperative to employ inventive and sustainable approaches. At the core of these approaches lie waste workers, who assume an essential function within Solid Waste Management Systems (SWMS). The contributions of their efforts yield substantial advantages for both society and the environment; nonetheless, they frequently encounter obstacles such as societal marginalization, stigmatization linked to diminished social standing, and sometimes a perception of engagement in illicit behaviors. Literature done in South Africa on informal waste workers have identified some of these issues. With a population over 60 million individuals, the nation generates a substantial quantity of waste, approximated at 122 million tones on a yearly basis. Despite the considerable scale of this matter, the proportion of waste that undergoes recycling remains very modest, amounting to approximately 10% as of 2022. The majority of the remaining waste is typically disposed of in landfills or improperly discarded, dumped, or incinerated, resulting in significant environmental and health issues. Within this particular setting, the ZeroToLandfill (ZTL) project emerges a noteworthy endeavor. ZTL, situated in the suburbs of Rosebank and Mowbray in Cape Town, is primarily dedicated to the mitigation of landfill waste by means of recycling, composting, and horticultural practices. Beyond environmental impact, it also aims to provide much-needed employment opportunities for unemployed individuals in neighboring communities and within the Cape Town Metropolitan area. The project's impact extends beyond environmental factors, as evaluated through the application of the Sustainable Livelihood Framework (SLF). This methodology facilitated the assessment of the effects of ZTL on the well-being and livelihoods of its part-time employees, taking into account five categories of capital assets: human, social, physical, natural, and financial. The participants have reported a diverse range of benefits. Individuals have acquired personal development skills, a more profound comprehension of environmental concerns, and stronger social relationships, resulting in improved financial stability for some. The aforementioned results illustrate the diverse effects that community-led initiatives can potentially have, encompassing the ability to significantly alter the lives of individuals as well as the wider community. However, the project has encountered several obstacles. The participants have communicated several practical difficulties, including insufficient remuneration, disparities in job-related conditions, and the financial strain associated with commuting. These concerns underscore the significance of implementing complete support systems that encompass financial and structural requirements, thereby supporting the viability and efficacy of such initiatives. In conclusion, this study offers valuable insights into understanding waste management dynamics within local communities in South Africa. It also stresses the importance of continuous endeavors at both the local and institutional levels to promote sustainable behaviours and enhance the well-being of individuals concerned. Future research is crucial to further understanding of the socio-economic impacts of waste work and to develop strategies that genuinely improve the lives of underprivileged individuals, thereby enriching our comprehension of the waste sector's potential in driving socio-economic development in South Africa.

Key words:

Sustainable Livelihood Framework | Employment Opportunities | Waste Management| Socio-economic development | Meaningful Work

Plagiarism Declaration:

I hereby declare that this dissertation, titled "Semiformal waste management at the community level: A case study of employment opportunity creation in Cape Town, South Africa", is entirely my own work and has not been taken from the work of others, save and to the extent that such work has been cited and acknowledged within the text of my work.

1. I understand that plagiarism is the act of taking and using the whole or any part of another person's work and presenting it as my own without proper acknowledgment.
2. I have read and understood The University of Cape Town's rules and regulations on plagiarism.
3. I confirm that I have acknowledged the content derived from other sources and referenced them appropriately.
4. I understand that if I am found to have plagiarized, appropriate action will be taken by The University of Cape Town which could include failing the dissertation or even expulsion from the program.
5. No section of this dissertation has been submitted as part of any other academic award.
6. I understand that this dissertation may be electronically checked for plagiarism.
7. I have retained a copy of this dissertation for my records.

Signature: Signed by candidate Date: 21/12/2023

BLAIR NICHOLAS IMPSON | IMPBLA001

Acknowledgements

I would like to extend my deepest gratitude to Dr. Gina Ziervogel for her invaluable guidance, patience, and knowledge throughout the course of my Master's dissertation. Her expertise and thoughtful advice have been pivotal in shaping both the direction and success of my research. Dr. Ziervogel's unwavering support and encouragement have been a constant source of inspiration and motivation, making my academic journey both enriching and enjoyable.

I am also deeply thankful to my family, whose endless love, belief, and support have been the bedrock of my strength and perseverance. Their sacrifices and unwavering confidence in me have been the driving force behind my academic pursuits. You have driven me to shoot for the stars.

To my friends, I owe a debt of gratitude for their companionship, understanding, and moral support. They have been a source of joy and relief during challenging times, reminding me of the importance of balance and well-being. Thanks for always motivating and encouraging me to be the best version of myself.

This journey would not have been the same without all of you, and I am profoundly grateful for each and every one of you who has been a part of it.

Contents

Chapter 1: Introduction

Waste workers play a crucial role within the Solid Waste Management Systems (SWMS) of developing nations, fulfilling many significant duties that yield societal and environmental advantages (Adama, 2014; Dias, 2016). The authors Adama (2014) and Dias (2016) argue that the contribution of keeping clean urban environments is significant in terms of public health, as it aids in the reduction of infectious disease transmission. According to Adama (2014), waste workers contribute to the increased efficiency of landfills by reducing the quantity of rubbish that is ultimately deposited, hence extending the duration of their operational lifespan. Moreover, these individuals play a crucial role in the economy by providing valuable resources to the recycling industry that would otherwise be discarded (Dias, 2016).

Despite the important role they provide, waste workers frequently encounter marginalization within society. Individuals that belong to this group are commonly linked with a lower social status and are often marginalized from participating in significant decision-making procedures pertaining to waste management (Mbah & Nzeadibe, 2015; Vidanaarachchi et al., 2006). In certain cases, they are also regarded as individuals engaged in unlawful activities such as theft, this is more common with informal waste pickers or 'scavengers' (Pandey, 2011). Waste pickers in the Global South and other regions include individuals scavenging for food, clothing, and essentials, informal recyclers selling to intermediaries or companies, and organized members of unions or cooperatives. Despite their presence in public spaces, they often remain invisible and stigmatized. Their significant environmental and economic contributions to local governments, communities, and value chains are largely unrecognized (Sampson, 2016).

The global challenge of municipal solid waste management has emerged as a major concern in the twenty-first century, particularly as a result of rising waste generation rates in developing nations (Poole & Basu, 2017; Marshall & Farahbakhsh, 2013; Al-Khatib et al., 2010). According to the World Bank (2022), waste production is expected to rise to 3,4 billion tonnes by 2050. Ineffective waste management has significant direct and indirect costs, including negative effects on health, productivity, functioning of ecosystems, flood risks, as well as damage to vital industries like tourism (Jain et al., 2021; Kaza et al., 2018; Wilson, 2015).

The current model of waste management in South Africa has numerous flaws, making it far from ideal. It predominantly consists of the linear model of extraction, production, distribution, consumption, and disposal, which undervalues the resources that are ultimately discarded. Consequently, landfills are nearing capacity and a waste management crisis is intensifying (Department of Environmental Affairs, 2018). Several of South Africa's most important landfills are in deteriorating condition and unable to

accommodate the increasing waste streams caused by the country's population growth and economic development. The Department of Environmental Affairs (DEA) issued a warning in 2018 that landfills in the Western Cape and Gauteng, the most populous provinces, were close to reaching capacity. New landfills are costly and time-consuming to construct, which makes waste prevention even more financially advantageous. Waste has an unrealized potential that can be unlocked through proper management, but it is undervalued at present.

In many ways, waste is an underutilised resource with the potential to unlock substantial economic value and contribute to job creation. According to the Department of Environmental Affairs (2016), a 20% reduction in industrial waste and a 60% reduction in domestic waste sent to landfills could unlock R9.2 billion worth of resource value for the economy. Secondary resource recovery and reintroduction to the local economy has the potential to generate more jobs and improve living conditions than current waste management practises (Hoornweg et al, 2013).

In conjunction with the elevated unemployment rates in South Africa, the waste sector has been recognised in several national and provincial strategy and policy papers as a sector capable of fostering the nation's economic expansion and employment opportunities (National Waste Management Strategy, 2020). As a burgeoning economic sector, characterised by an anticipated annual turnover of at least R15.3 billion, this sector exhibits promising prospects for expansion, potentially reaching a size double its current magnitude, contingent upon substantial investments from both governmental and private entities (CSIR, 2023).

ZeroToLandfill (ZTL) is a recycling, composting and gardening project in Rosebank and Mowbray (Cape Town) that aims to reduce waste sent to landfill and provide income for unemployed residents in surrounding communities. ZTL is a new model for waste management being implemented, which addresses a number of issues and aims to achieve multiple objectives simultaneously. Among these are reducing unemployment, the procurement of knowledge, skills, and experience among the employees, providing goods and services to the public, and perhaps most importantly, contributing to a massive national effort to improve the country's waste situation.

The significance of job creation within the waste management industry has been underscored in research such as the Operation Phakisa report: Waste and Energy (2017). Nevertheless, a significant study deficit exists with regards to the impacts of these positions, particularly in relation to the wellbeing and livelihoods of employees. The assessment of these impacts can be effectively facilitated by utilising the Sustainable Livelihood Framework (SLF) which will be used as the theoretical framework of this study. The SLF, originally designed for rural areas, has demonstrated its versatility in urban contexts as well, which is particularly significant considering the growing attention towards

urban poverty (Farrington et al., 2002). The framework facilitates a methodical assessment of how individuals navigate the management of assets in the face of diverse vulnerabilities and institutional contexts, as well as how these strategies for sustaining livelihoods influence overall well-being. Consequently, it provides a dynamic approach for monitoring the potential advantages and disadvantages associated with employment in the waste management industry.

The sustainable livelihood framework (SLF) will be used in this thesis to analyse the impact of the ZeroToLandfill (ZTL) project on the well-being and livelihoods of the part-time workers involved. The SLF is a widely recognized tool used to assess and understand the complexities of livelihoods in different contexts. It provides a holistic approach that recognizes the interdependence between the five capital assets - human, financial, social, natural and physical - and how they interact with each other in shaping livelihoods. The SLF recognizes that individuals have agency and can influence their own livelihoods, and that external factors such as policies and institutions can either support or constrain livelihood opportunities. Due to the limited time and scope of a minor dissertation, this study will not include the political and institutional barriers or enablers but recognises them as key factors in influencing livelihoods.

By using the SLF, this thesis aims to provide insights on how the ZTL project can not only reduce waste sent to landfills but also how the participants involvement in the project has impacted their five capitals. The changes in their five capitals will further be explored to assess strategies or behaviours that emerged due to these changes. Analysing these changes and impacts will allow for a deeper understanding of whether employment was meaningful and furthermore if an improvement in the workers well-being was achieved. Additionally, using the SLF will help to identify areas for improvement and add to the body of knowledge which can be used to inform future waste management interventions. Overall, the use of the SLF is critical in understanding how waste management projects can contribute to sustainable livelihoods and in designing developmental projects such as ZTL, that support the most vulnerable in society.

The impact of waste management on employees' standard of living has not been extensively studied, despite being considered a tool for creating employment opportunities. Noel (2010) conducted a qualitative analysis in Greater Port-au-Prince, Haiti, to investigate the participation of waste workers in the solid waste management industry and its implications for their livelihood strategies. The study found that state agencies pay their employees so little that they remain at the bottom of the economic ladder, highlighting that formal employment may not always be sufficient for an individual's financial stability. To date, no comparable research has been conducted in South Africa.

Understanding the impact of waste management initiatives such as ZTL on workers' livelihoods will generate additional information that can be used to inform policy decisions such as in future National Waste Management Strategy documents and ensuring that these initiatives positively impact workers' well-being. This study aims to provide empirical evidence on the viability and significance of employment at the ZTL project which increases the body of knowledge on waste work, thereby contributing to a better understanding of the sector's potential for enhancing livelihoods and promoting socioeconomic development in South Africa.

The literature review of this thesis will lay the foundation for the study by establishing the global and local context of the research problem. Before describing the research's aims, objectives, and questions, the paper will delve into the research problem itself, emphasising the need to investigate the impact of waste sector employment on livelihoods. Subsequent chapters will delve into the study's methodology, analysis, and findings, concluding with a discussion of the implications of the findings and recommendations for future research.

Problem statement:

There exists a significant gap in research regarding the quality and sustainability of employment opportunities within the waste management sector, particularly concerning the well-being and livelihoods of the workers. This thesis, employing the Sustainable Livelihood Framework (SLF), aims to analyse the impact of the ZTL project on the livelihoods of its part-time workers, focusing on how their involvement has influenced their five capitals – human, financial, social, natural, and physical. This research will contribute to understanding the socio-economic impacts of waste management initiatives like ZTL on workers' livelihoods, providing empirical evidence to add to the body of knowledge which helps to inform policy decisions and future National Waste Management Strategy documents. The goal is to ensure that such initiatives positively impact workers' well-being and contribute to socioeconomic development in South Africa.

Aim and objectives

This study aims to determine the socio-economic impacts of the ZTL Project on the livelihoods of its part-time minimum wage employees and whether these impacts lead to improved livelihood outcomes.

The objectives:

1. Evaluate the development of the five capital assets (human, financial, social, natural, and physical) of part-time employees during their participation in the ZTL project.

2. Investigate how participation in the ZTL project has influenced the attitudes and comprehension of employees regarding waste management.

3. Examine the potential and challenges for locally-focused, community-driven initiatives, such as the ZTL project, to provide long-term opportunities for disadvantaged individuals.

Chapter 2: Literature Review

2.1) Introduction to waste management in South Africa

The latest data shows that the recycling rate in South Africa stands at a mere 11%, indicating that the bulk of waste is either sent to landfills, discarded haphazardly, dumped, or incinerated (StatsSa 2022). Given that South Africa's population, just above 60 million, generates about 122 million tonnes of waste annually, improper waste management can potentially wreak havoc on the nation's economy (StatsSa 2022). Although managing waste has a cost, it also provides employment and stimulates the economy. A GreenCape Report (2020) showed that waste management contributes R24.3 billion to the South African GDP, offering 36,000 formal jobs and roughly 80,000 informal job opportunities.

The GreenCape report suggests that reducing industrial and household waste sent to landfills by 20% and 60%, respectively, could unveil an economic resource valued at R9.2 billion. This shows the untapped potential in the nation’s current waste practices. Developing nations, such as South Africa, often face a number of challenges and therefore waste management rarely falls at the list of top priorities. Grebestebet et al. (2015) reported that in many sub-Saharan countries it is common for other sectors to receive higher priority than waste sector due to other more pressing issues such as health problems or unemployment. This can lead to underfunding and lack of resources to provide adequate waste management services throughout the nation.

Impoverished communities that do not contribute to municipal levies generally lack adequate waste management infrastructure and services, resulting in poor methods for handling and disposing of waste. A study conducted in Tanzania by Vikblad and Lekare (2017) revealed that a significant obstacle in managing waste was the locals' reluctance to pay for waste disposal costs. Community participation was proposed as a viable option to reduce waste collection fees. According to Keita et al. (2002) and Rathi (2005), including the community and/or households in waste management is more cost-effective than relying only on municipal authorities. Additionally, this approach leads to a healthier and cleaner environment (Rathi 2005).

In terms of regional performance in waste management, the Western Cape tops the list with a household waste separation rate of 20.3%, as per a 2015 survey by StatsSa. Across the nation, only 13% of metropolitan households claimed to sort their waste for recycling. The percentages stand at 11% and 3% for urban and rural households, respectively (StatsSa, 2022). According to a 2022 Cape Argus article written by Sibulele Kasa, The Department of Environmental Affairs and Development Planning (DEADP) made the decision in 2012 to initiate a 50% reduction in organic waste, with the ultimate objective of adopting a complete prohibition by the year 2027 in order to promote increased adoption of recycling practises.

The Cape Argus article also mentioned that the Western Cape government had not achieved the prescribed objective, since a mere 15 out of the total 30 municipalities within the province had filed their waste diversion strategies. The failure has been attributed by councils to the reallocation of money towards policies aimed at addressing the Covid-19 pandemic. According to estimates, almost 25% of the garbage present in landfills consists of organic materials. This encompasses a variety of raw materials, including food items and garden trash, among others. The DEADP's director for waste management, Saliem Haider, also mentioned in 2022 that "currently 32% of that (organic waste) is recycled, which means that there is still 68% of the organic waste that has the opportunity of diversion."

When waste is improperly managed, indirect expenses must be carefully considered due to the negative externalities that can arise and more costly long-term impacts of mismanagement. The cost of inaction on waste is estimated to be 5-10 times the cost of management (Kaza et al., 2018; Wilson, 2015a). These losses include damages to health, productivity, increased flood risks, and damages to businesses, particularly in the tourism economy (Wilson et al., 2015a, b). Plastic pollution on beaches, according to a study conducted in Cape Town, has the potential to reduce tourism revenue and employment by up to 91% (Jain et al., 2021). According to the WWF report titled "Plastics: The cost to society" published in 2021, the minimum life cycle cost of plastic produced in South Africa in 2019 was $60.72 billion (Dalberg, 2021). These include the direct costs of cleaning up the mess as well as the indirect costs that the accumulation of plastic waste has on coastal fisheries, tourism, and the healthcare industry.

Avoiding these costs through proper waste management can only be achieved with sufficient financial and human resources in the countries waste sector. Funding projects such as ZTL allows for the generation of employment opportunities which in turn reduces the countries high unemployment rate. South Africa's unemployment rate, particularly among young people ages 15 to 35, is approximately 53% (StatsSA, 2018). Herein lies an opportunity in the waste management industry, which currently employs between 60,000 and 90,000 people in informal recycling collection, a number that could rise to 215,000 as cities expand and unemployment rises (Gutberlet, 2017). These waste collectors contribute significantly to the reduction of landfill space, demonstrating the environmental and economic potential of this sector.

Exploring Unemployment and Opportunity within Waste Management

In 2014 the CSIR stated that by averting landfilling of recyclable materials, informal collectors saved municipalities between R309 million and R740 million in landfill space for 2014 alone. Broad implementation of community recycling initiatives, such as ZeroToLandfill, could enhance waste

diversion from landfills, and simultaneously create employment opportunities. If the waste management industry were to create and actively advocate for higher-quality jobs, this would offer safer and more lucrative working conditions for informal waste collectors and unemployed individuals.

A significant proportion of unemployed individuals live under harsh circumstances, often falling prey to detrimental behaviours and vices, including substance abuse (Henkel, 2011). The provision of formal employment and regular salaries could improve their financial stability (Jahoda, 1982). The formalization of employment in the waste sector could uplift these individuals socioeconomically, leading to improved well-being, deriving from a heightened sense of community importance and life purpose (Burchell et. al, 2014). It is anticipated that consistent and reliable income would yield improvements in food security and nutrition, alongside positive shifts in social and behavioural norms (Loopstra & Tarasuk, 2013). Highlighting the waste sector as a key driver of global economic growth and development could entice government and private investment and catalyse action towards the sector's sustainable development (Kaza et. al, 2018).

Investments in waste management infrastructure have the dual benefit of creating thousands of jobs and mitigating detrimental impacts on human and environmental systems. A study by Amegah and Jaakkola in 2016 pinpointed Sub-Saharan Africa as the world's fastest urbanizing region, simultaneously plagued with an escalating poverty trend. This underscores the necessity for transformative changes in waste management in addition to job creation, to enable metropolitan municipalities to manage increasing waste volumes resulting from population growth and economic development.

In 2017, The Department of Environmental Affairs (DEA) conducted Operation Phakisa: Chemicals and Waste Economy. The DEA identified 20 initiatives across four work streams to divert 20 million tonnes of waste from landfills during this session. If realized, it was estimated that these initiatives could unlock an additional R11.5 billion per year to help create 45 000 direct and 82 000 indirect jobs, as well as 4 300 small, medium, and micro enterprises (SMMEs). This has led to the DEFF's active role in regulation reform, support for industry SMMEs, and investment in landfill diversion infrastructure. The opportunity for unlocking the economic potential in municipal solid waste is clear as well as provision of jobs and employment potential. The question, however, remains whether this kind of employment is meaningful and long lasting. Livelihoods of workers in the waste management industry, especially those with entry-level positions will be discussed below to understand the complexities of working in waste management and whether it is really a tool that provides meaningful employment opportunities.

2.2) Overview of Present Social Enterprises in Waste Management

The DG Murray Trust (DGMT) performed an investigation in 2020, titled "The Potential of Social Enterprises in South Africa for Waste Management and Reduction". This examination was executed with the objective of understanding the context and reasons behind the successes and failures of current projects in South Africa. The appraisal of local recycling and organic waste management ventures provided important context for understanding the economic, political, social, and environmental aspects of waste management in South Africa, which in turn has implications for this study.

Rhino Manufacturing and Siyabuddy Recycling and Waste Management are two South African social enterprises mentioned in the DGMT's review which faced significant challenges amidst their efforts to create social and environmental impact. Rhino Manufacturing, involved in producing goods using 90% recycled plastic for various sectors, provides employment to 80 individuals, each supporting an average of five dependents. Despite its environmental and social goals, the firm nearly collapsed under high input costs and tough macroeconomic conditions (Pillay, 2019) but was rescued by funding from the Industrial Development Corporation (IDC).

Similarly, Siyabuddy, focused on recycling and waste management in Nkomazi Municipality (Mtshazo, 2018), created jobs for young people and income for over a thousand waste collectors (SEED, 2020). However, it also struggled with cash flow and resource constraints, requiring a significant grant from the IDC for expansion and leadership support. These cases highlight the vulnerabilities of social enterprises in challenging economic environments, underscoring the need for external support to sustain their social objectives and operations. This is pertinent to the ZTL project as a lack of cash-flow could directly affect the employees, potentially resulting in job losses, pay reductions or termination of the project.

2.3) Lessons from waste co-ops in South Africa

South Africa's Solid Waste Management (SWM) sector faces significant challenges, as identified in studies by DST (2016) and Godfrey et al. (2016). A key issue is the lack of essential skills among the workforce, which grew notably in 2016 with over 60,000 jobs created in informal waste recovery and recycling. Most of these positions are filled by unskilled workers, raising concerns about the sustainability of such practices in the increasingly demanding SWM sector. There is a pressing need for trained personnel to handle technical aspects like environmental compliance and space optimization. While unskilled labour is in demand due to the labour-intensive nature of SWM activities, equipping these workers with essential skills is vital for efficient value chain management.

On the other hand, efforts to formalize the informal waste sector through co-operatives have encountered substantial challenges, with a failure rate of 91.8% among such entities (Godfrey et al., 2016). Key issues include inadequate infrastructure, limited transportation, and insufficient facilities for sorting and storing recyclables. Operational challenges like limited market access and recyclable theft further exacerbate the situation. Although co-operatives are a global trend, especially in developing countries, and have seen more organized integration in regions like Latin America, they often struggle with funding, transportation, and governance issues, leading to numerous failures and insolvencies (Godfrey et al., 2015; ICA, 2013b). Understanding these obstacles, categorized into infrastructure, operational, technical, administrative, and financial challenges, is crucial for improving the situation of waste management co-operatives.

2.4) Livelihood Effects of Employment in Waste Management:

The Operation Phakisa: Waste and Energy report (2017) demonstrates the significant potential of waste management in generating employment opportunities, as evidenced by a wealth of literature on the subject. However, there is a scarcity of research examining the meaningfulness and sustainability of entry-level employment opportunities in the waste sector, and their impacts on workers' standard of living and well-being. Pandey (2011) and Claudel and Noel (2010) conducted studies utilising the Sustainable Livelihood Framework (SLF) to assess the impact of waste work on the livelihoods of waste workers in Nepal and Haiti, respectively. The objective was to determine whether waste work can improve their livelihoods and enhance their ability to cope with unforeseen challenges such as illness, unemployment, or physical injury.

Pandey (2011) determined that waste workers in Kathmandu experience wage inequality and marginalisation in the economic, social, and political domains. These issues, along with the poor status of their livelihood capitals, hinder their ability to effectively deal with pressures or unexpected events such as illness, delayed payment, or loss of income. Noel discovered that waste workers were significantly undercompensated and occasionally experienced prolonged delays in receiving their wages. The 2010 study conducted by Claudel & Noel in Greater Port-au-Prince, Haiti, examined the impact of involvement in the solid waste management sector on workers' methods for sustaining their livelihoods.

The study encompassed interviews with 390 individuals employed in various waste management sectors. One aspect of the study examined the probability of personnel resigning from their positions in the waste management industry. A majority of state agency workers (53%) stated a desire to depart, a much greater percentage compared to waste 'scavengers' or informal collectors. The study revealed that the workers employed by state agencies earned such meagre wages that they continued

to face economic disadvantages, hence highlighting the insufficiency of formal employment in ensuring individual financial sustainability.

In a study conducted by Vikblad and Lekare (2017) in Tanzania, it was discovered that waste workers were primarily concerned about the scarcity of financial capital, which posed the greatest challenge among all other forms of capital. This was underscored by the workers' testimony that none of them were capable of accumulating any savings from their wages. Frequently serving as the primary breadwinners in their family, their income was not adequate for supporting their household. These studies emphasise that waste workers frequently receive the minimum wage, which is inadequate to sustain their livelihood. In a 2016 study conducted by Melanie Sampson and Sonia Maria Dias on waste pickers, similar financial concerns emerged for waste pickers who often struggle with achieving financial stability due to fluctuating prices of recyclable materials, making their livelihoods precarious and uncertain.

Initially, the SLF was crafted and implemented primarily in rural environments, but its application has since extended to urban settings. As urban populations continue to grow, addressing urban poverty has become more critical. According to a study by Farrington et al. (2002), despite distinctions between urban and rural settings, such as capital accessibility and differing vulnerability indices, the SLF is equally applicable to both urban and rural areas. This framework systematically identifies how people manage assets within the context of vulnerability and institutional frameworks and traces how livelihood outcomes contribute to consumption, investment in assets, or reduction of vulnerability, allowing for dynamic tracking of activities.

2.5) Theoretical Framework - The Sustainable Livelihood Framework (SLF)

The SLF was initially designed and used in rural contexts, however, subsequently it has been implemented in urban contexts too (Walker et al, 2002). In the coming decades, reducing urban poverty is likely to become an increasing priority for governments and development organizations (UN-Habitat, 2016). As rural–urban migration continues, urban populations are increasing and more stress is put on their infrastructure and services including waste management (Tacoli, 2009). In most contexts, urban areas provide the poor with significantly more opportunities and fewer social restrictions in terms of their livelihood options (Satterthwaite et al, 2010). These opportunities, however, will only be realized if urban development is designed to include the aspirations of the poor (Mitlin et al, 2013).

The five capitals (Fig 3.2) are instrumental in facilitating meaningful engagement and transformation of one's world (Morse & McNamara, 2013). In the context of the SLF, the terms "engagement" and "transformation" have specific implications related to how individuals interact with their environment

and the various assets they have access to, aiming to improve and sustain their livelihoods. Engagement here refers to the active involvement or participation of individuals or communities in utilizing the five capitals. These include utilising skills, leveraging infrastructure or engaging with financial systems. Transformation, in this context, implies the changes, adaptations, or improvements that individuals or communities can achieve through engagement with the five capitals such as through enhanced income or strengthened social networks. They contribute to a person's ability to sustain a livelihood, with health being a significant determinant of access to natural resources and the ability to work (Nzeadibe & Mbah, 2015). These capitals are interconnected, demanding a holistic perspective. Each of these five capitals are detailed below in the context of the Sustainable Livelihood Framework.

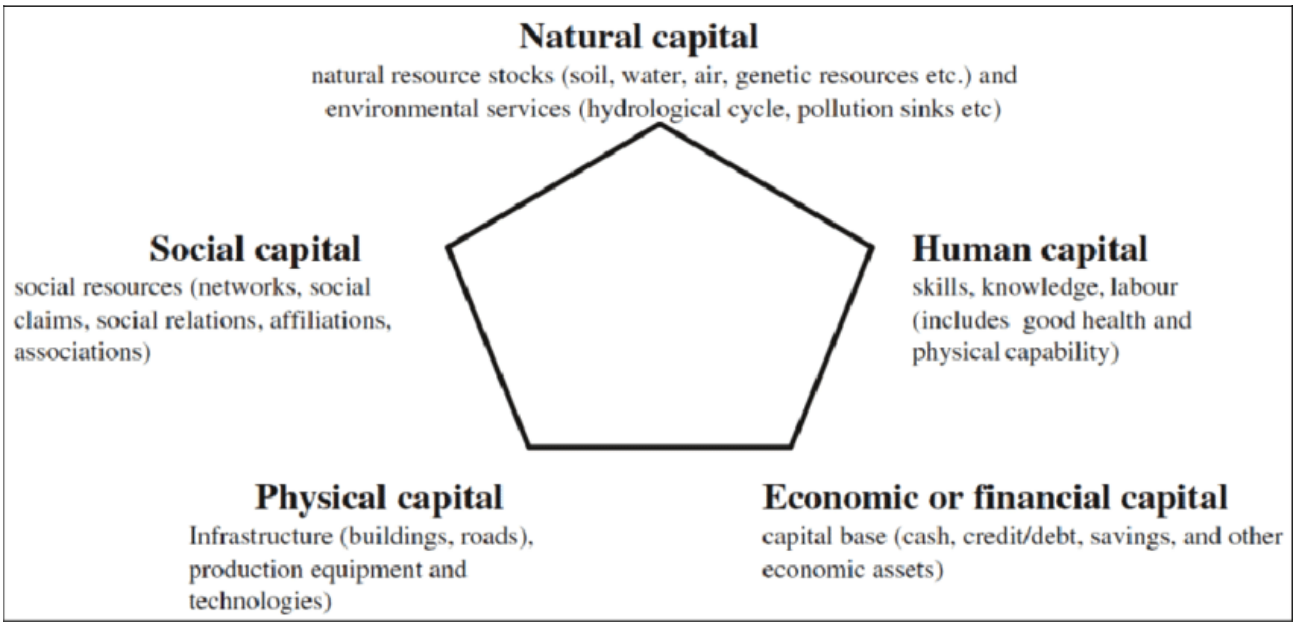


Figure 1: Different Capitals in the SLF (Source: Morse & McNamara, 2013)

2.5.1) Human Capital: This involves the skills, knowledge, ability to work, physical prowess and health vital for the successful execution of various livelihood strategies (Morse & McNamara, 2013; Allison & Horemans, 2006; Kollmair & Gamper, 2002). Human capital is dictated by the quantity and quality of labour resources within a household and can vary depending on the household size, skill sets, leadership capacity, health conditions, and so forth. As poor health and inadequate education are often seen as hallmarks of poverty, overcoming these issues is seen as a core strategy for sustainable living and a foundation for the development of other capitals. Two tools were implemented in this study to access human capital. The Employee Satisfaction Index and The Work and Meaning Inventory. These tools are further explored below in subsections 2.8 & 2.9.

2.5.2) Social Capital: This refers to the social relationships and societal norms that form a key foundation for sustainable livelihoods (DFID, 1999). Social capital positively impacts well-being by providing a sense of identity, dignity, and belonging and serves as an informal safety net during times of severe insecurity (Kollmair & Gamper, 2002; Bebbington, 1999). It is cultivated through networks, engagement with formal groups, mutual trust, and exchanges (Isakson, 2011).

2.5.3) Financial Capital: This refers to the financial resources that are available or can be accessed to pursue any livelihood strategy, such as cash, credit, savings, and other economic assets (Deressa, 2013). It plays a crucial role as it directly impacts livelihood outcomes, for instance, by reducing food insecurity through the purchase of food (Krantz, 2001; Bebbington, 1999).

2.5.4) Natural Capital: This involves natural resources like water and land access (Ruben, Pender & Kuyvenhoven, 2007; Krantz, 2001). While it is particularly essential in agricultural settings, it also includes basic necessities like access to drinking water in landfill sites. Working in sustainability projects can have impacts on perceptions and behaviours that extend into people personal lives as noted by Brown & Williams (2017) and Al-Khatib et al. (2010) Projects centred on waste management can lead to cleaner environments, contributing positively to natural capital.

2.5.5) Physical Capital: This encompasses essential infrastructure, including equipment, vehicles, housing, electricity, and producer goods, necessary to sustain livelihoods (Seratti, 2008). Measuring this aspect is vital because its absence can impede livelihood attainment. For instance, improved community infrastructure, such as roads, can reduce transaction costs, thereby lessening the need for self-provisioning (Winters, Hintze & Ortiz, 2006).

2.6) Tools for Human Capital Assessment

For human capital evaluation, the study utilized two distinct tools: the Employee Satisfaction Questionnaire by The Academy to Innovate HR (AIHR) and The Work and Meaning Inventory (WAMI) by Steger et al. (2012). These tools, detailed in Appendix 1, probe into facets like positive meaning, meaning-making through work, and contribution to greater societal good as well as overall expectations, work satisfaction and career growth.

2.6.1) The Academy to Innovate HR's Employee Satisfaction Index (ESI)

A questionnaire was used to determine employee satisfaction which was originally developed by the Academy to Innovate HR and adapted for this study. The questionnaire consists of three inquiries that are employed to assess the level of job satisfaction among employees and was used to determine whether satisfaction affected willingness to leave the ZTL project. When employees experience dissatisfaction, there is an increased likelihood of them quitting. According to a report by the Work Institute (2020), career development, or the absence thereof, is a prominent factor contributing to employee turnover. In the report, it was observed that individuals who experience a lack of satisfaction or see a lack of growth prospects are inclined to actively pursue alternative employment possibilities. Furthermore, it is worth mentioning that Harvard Business Review has published numerous papers pertaining to this subject matter, emphasising the significant impact of employee satisfaction and engagement on the retention of personnel. According to Harter, Schmidt, and Hayes (2002), several factors such as recognition, growth possibilities, and supervisor relationships have a substantial impact on an employee's choice to remain with or leave an organisation.

2.6.2) WAMI – Psychological meaningfulness

Introduced by Hackman and Oldham in 1976, Psychological Meaningfulness (PM) in work has become a pivotal concept in work psychology. It pertains to the personal significance individuals ascribe to their actions, directly influencing job satisfaction and motivation. Studies emphasize the correlation between finding meaning in one's work and an individual's overall sense of purpose, effectively bridging the gap between professional endeavours and personal calling (Steger & Dik, 2010; Michaelson, 2005). Such meaningful work not only advances an individual's understanding of their identity but also fosters personal growth. Furthermore, it aligns with aspirations to contribute to the greater good, with the literature underscoring the importance of work that has a positive impact on others (Dik & Duffy, 2009; Grant, 2007). This often results in amplified job satisfaction and a more profound sense of purpose. The Work and Meaning Inventory (WAMI) was used in this study to understand whether participants found their work at ZTL and in an environmental sustainability project meaningful and gave them a greater sense of purpose.

Chapter 3: Case Study

ZeroToLandfill (ZTL) is a recycling, composting, and gardening project located in Rosebank and Mowbray, (Western Cape Province, South Africa (Figure 1 & 2), which aims to reduce waste sent to landfills and provide employment opportunities for unemployed residents in surrounding communities. The project was initially funded by the Presidential Project, through The Industrial Development Corporation of South Africa Ltd (IDC). Funding was sent to the Community Organisation Resource Centre (CORC) who distributed the wages to the participants. To create employment opportunities, the project allocated a portion of its budget for the minimum wages of 15 part-time community recyclers and gardeners. Initially it was planned to hire informal waste collectors who had experience working with waste to bring them into more formalised employment. A meeting was arranged but none of the waste collectors invited to this meeting took up the employment opportunity and therefore the project resorted to finding people from the surrounding community who were unemployed and seeking employment. Participating households in the Mowbray and Rosebank neighbourhoods volunteered to separate their waste at the source into separate bags which were provided by ZTL. These include a transparent bag for recyclables, a green bag for garden refuse, and a bucket for organic kitchen scraps.

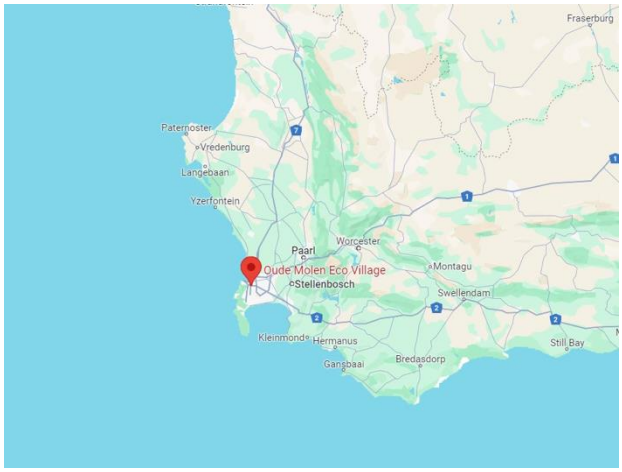


Figure 1: South-Western peninsular of South Africa. The pin is the site location (Source: Google Maps)

Figure 2: Aerial View of ZeroToLandfill organic farm and recycling centre (Source: Google Maps)

Using bicycles and trailers (Figure 3), the collectors picked up kitchen and garden waste, as well as all other recyclable materials from local households. The community gardeners converted the kitchen and garden waste into compost and helped to cultivate vegetables and the sorters separated and managed the recyclables. Once the initial funding for the project expires (potentially in mid2024), it is planned that profits from the sale of recyclables (Figure 4), compost, and vegetables would be distributed among the employees and reinvested in the project to ensure its continuation.

Figure 3: Collection bikes and trailers can be seen (Source: Impson, 2023)

Figure 4: Collection Day – Large truck collecting the recyclate (Source: Impson, 2023)

ZeroToLandfill's service approach to waste management is at the level of the community, where collection, separation and sorting all happens within the Rosebank and Mowbray suburbs. Members of the households have access to messaging groups where they can ask questions and express any concerns or worries. In addition, ZTL employs a transport and collection model (zero emissions) that does not require the use of large trucks to transport waste from residential areas to waste management facilities or dumpsites, both of which are typically located at great distances. Bikes have been fitted with collection storage containers (Figure 3.) in order to collect waste from the households and are operated by the collection team.

Once recyclate has been separated it is sold to and collected by a larger processing company (Figure 4.). Oude Molen acted as the site for storage and sorting of materials as well as the community garden (Figure 5&6). The Oude Molen Eco Village, located in Pinelands, is a thriving community of micro-businesses, non-profit organisations, and social enterprise services. It was converted from an abandoned and vandalised hospital complex into a holistic, environmentally friendly, village that provides employment, food security, and youth development to the surrounding communities. The village provides a variety of facilities, including metal, wood, and craft enterprises, social projects and food gardens.

Figure 5: Organic Gardening done in material grow bags at Oude Molen (Source: Impson, 2023)

Figure 6: Close up of vegetable and herb varieties grown at ZTL (Source: Impson, 2023)

Chapter 4: Methodology

4.1) Introduction

This chapter outlines the methodology employed in this research study, focusing on the application of the Sustainable Livelihood Framework (SLF) to evaluate the socio-economic impacts of the ZeroToLandfill (ZTL) project on participants' livelihoods. The research design integrates quantitative and qualitative methods, utilizing a carefully structured questionnaire based on the SLF's five capitals—human, physical, financial, social, and environmental. The methodology also includes semi-formal interviews to capture nuanced, personal experiences from the participants. This multi-faceted approach ensures a comprehensive understanding of the impacts and interactions within these capitals, thus providing a deep insight into the effectiveness and broader implications of the ZTL project.

4.2) Research Design

The study adopts a case study approach, suitable for examining complex phenomena within their real-life context. This design, focusing solely on the ZTL project, allows for in-depth, onsite investigation and adaptation as the project unfolds. It offers the opportunity to uncover unforeseen subtleties of project impacts and to utilize these findings in forming robust hypotheses for future research. While this close proximity to the subject can increase the risk of subjectivity and bias, it is instrumental in providing a rich analysis of each participant. The literature supports the use of diverse data collection methods in case studies, facilitating an integrated analysis of quantitative and qualitative data.

4.3) Population, Sampling, and Research Site

Study Participants and Site Description: The research was conducted at the ZeroToLandfill (ZTL) project site which was located at Oude Moulen in the suburb of Mowbray, with participants including not only semi-formal workers but also management and other staff involved in the project. Sampling was purposive, focusing on individuals directly engaged in various capacities within the project, ensuring a broad representation of perspectives and experiences. The study group is further detailed towards the end of the chapter.

Ethnographic Engagement: Initial ethnographic methods included meetings and participatory observations with the ZTL team to build trust and rapport, essential for subsequent interviews and questionnaire distribution.

4.4) Data Collection Methods

The primary data collection method for this study was qualitative interviews, a choice differing from quantitative methodologies in its broader, more adaptable approach and less rigid structure, as noted by Bryman (2016). Qualitative interviews are inherently dynamic, fostering a rich interaction between interviewer and interviewee. This interaction is crucial, as it emphasizes the interviewee's viewpoint, encouraging detailed and insightful responses (Kvale & Brinkmann, 2009). The small survey group size in this study further enhanced the opportunity for in-depth data extraction, utilizing semi-formal interviews and questionnaires to delve deep into the experiences of both participants and selected management.

Qualitative interviewing can be categorized into unstructured and semi-structured (informal and semi-formal) methods. Unstructured interviews flow freely from an initial question, encouraging spontaneous discourse, while semi-structured interviews adhere to a pre-set list of topics and questions (Bryman, 2016; Brinkmann, 2013). For this dissertation, the semi-formal approach was deemed most suitable. By incorporating longer, open-ended questions along with Likert scale queries in the semi-formal interviews, the study aimed to capture the unique experiences of each respondent. This format allows for the organic development of follow-up questions in response to particularly interesting or significant answers (Smith, 2015).

However, qualitative interviews, especially those involving open-ended questions, come with challenges. There's a risk of interviewer bias influencing the narrative (Longhurst, 2003), and linguistic barriers and potential misunderstandings can complicate matters. This was particularly relevant in this study, as English was not the first language of all respondents. To maintain response authenticity, all interviews were recorded and transcribed. When participants encountered difficulty with specific terms, a bilingual team member provided clarification.

Integration of Data Collection Methods: The Five Capitals questionnaire integrated both quantitative and qualitative research methodologies. The questions used the Likert scale as a quantitative method to assess the attitudes, perceptions, and experiences of the individuals. The utilisation of structured questions enabled the acquisition of data points that could be readily compared, hence facilitating the application of statistical analysis techniques to discern patterns, correlations, or trends.

Simultaneously, open-ended questions were also included with the intention of eliciting individual narratives of each participant involved in the study. This allowed participants the freedom to articulate their thoughts and opinions, resulting in a valuable collection of qualitative data. Drawing on this

combination of questions helped balance standardised and quantifiable responses, while also digging into the unique stories of individual participants.

4.5) Data Analysis

Quantitative Analysis: Statistical techniques were applied to analyse the Likert scale data, identifying patterns and trends related to the socio-economic impacts on participants.

Qualitative Analysis: Thematic analysis was used for the qualitative data from interviews, identifying and categorizing themes related to participants' personal experiences and perceptions.

Integration of Analysis: The findings from both quantitative and qualitative analyses were integrated to provide a holistic view of the impacts of the ZTL project on the livelihoods of the participants.

4.6) Ethical Considerations

Ethical Clearance: The study received ethical clearance from the appropriate institutional review board at the University of Cape Town. Ethical considerations included informed consent, confidentiality of participant information, and the right to withdraw from the study at any time.

4.7) Trustworthiness and Reliability

Ensuring Data Integrity: Measures to ensure the trustworthiness of the data included method triangulation, participant validation of the findings, and detailed documentation of the data collection and analysis processes.

4.8) Application of the Sustainable Livelihood Framework (SLF)

This research study utilises the SLF to examine the socio-economic impacts of participant roles in the ZTL project. The process of integration was principally achieved by means of developing and implementing a comprehensive questionnaire that was firmly grounded in five capitals expressed in the SLF framework.

4.8.1) Developing the Questionnaire using the SLF:

The questionnaire was carefully constructed based on the five capitals that are integral to the SLF: human, physical, financial, environmental, and social. The study sought to obtain a comprehensive and multifaceted understanding of the participants' experiences and the resulting effects on their livelihoods by framing the inquiries in relation to these five capitals. Each portion of the questionnaire was aligned with one of these capitals, enabling a systematic way to gathering data. The implementation of this structured framework facilitated an in-depth examination of the various

dimensions of each participant's lives which was then used to determine which capitals saw improvements, negligible changes or declines.

4.8.2) Process of gathering data through semi-formal interviews:

Data collection involved conducting semi-formal interviews between the researcher and the participants. The selection of this approach was made with the intention of cultivating an atmosphere characterised by trust and transparency. The utilisation of a questionnaire as a guiding instrument facilitated the implementation of semi-formal interviews, which offered a structured yet adaptable framework for engaging in dialogue as well as allowing participants to answer Likert style questions.

4.9) Evaluating the Five Capitals:

The methodology primarily revolves around an examination of five capitals with a special emphasis on human capital, explored through employment satisfaction and its significance. The Sustainability Livelihood Framework (SLF) was chosen as the theoretical lens to conduct the study through and collected data through interviews and a questionnaire. Scientific articles have been read and analysed for the previous research analysis. These have been found through Google Scholar, where key words such as sustainable livelihoods, employment opportunities, waste management and socio-economic development have been used.

To assess the Five Capitals a questionnaire was developed that utilised both Likert style questions and longer open-ended questions. The questionnaire was organised so that questions relating to each capital were grouped together. Likert style questions were first answered and once completed longer questions were answered in a semi-formal interview manner which allowed for conversation and engagement with any queries, misunderstandings or interesting insights. The Likert number range is shown below.

Table 1: Likert questions number range

1	2	3	4	5
Large deterioration	Small deterioration	No change	Small improvement	Large improvement

4.9.1) Human Capital:

Human capital refers to the collection of qualities possessed by an individual that contribute to their effectiveness and performance within an organisational context. Human capital includes a range of aspects, including one's health, education, knowledge and skills and capacity to work (Scoones 1998: 8). These attributes, which have a positive impact on the efficiency, creativity, and expansion of the organisation, serve as indicators of an individual's efficacy and worth as a member of the workforce. The significance of satisfaction and meaningful work in relation to motivation, productivity, and retention has been established in previous research (Thompson and Bunderson, 2018; Saks, 2006; Judge et al., 2001). Consequently, the absence of either element might have adverse effects on employee effectiveness. The assessment of human capital in this research will be carried out utilising the employee satisfaction questionnaire and The Work and Meaning Inventory (WAMI). How these tools are used and scored is detailed below.

4.9.1.1) Employee Satisfaction (AIHR)

Prior research has underscored the significance of employee satisfaction in relation to their well-being, productivity, and retention within an organization (Saks, 2006; Judge et al., 2001). Although not used in the South African waste management sector, the AIHR's Employee Satisfaction Index (ESI) provides a relevant framework for examining job satisfaction in this context. For the purpose of this study, the ESI questionnaire has been adapted to include six questions that were answered in a Likert scale alongside an additional set of four open-ended questions aimed at eliciting more personal responses. The following key was used to assist participants in answering the Likert questions with faces alongside each score for ease of understanding.

Key:  (1) very unsatisfied  (2) unsatisfied  3) indifferent  (4) satisfied  (5) very satisfied

4.9.1.2) Significance of Employment (WAMI)

The Work and Meaning Inventory (WAMI) by Steger (2012) was designed to assess the significance of work to an individual, focusing on three core aspects: the perception of work as meaningful, its role in providing broader life meaning, and aspirations to contribute to the greater good through work. The inventory comprises 9 statements, rated from 1 (completely false) to 5 (completely accurate).

The scoring involves summing ratings for specific questions to calculate three scores: "Positive Meaning," "Meaning-Making through Work," and "Greater Good Motivations." The Positive Meaning score, derived from questions 1, 3, 4, and 7, reflects how personally meaningful one finds their work. The Meaning-Making through Work score, from questions 2, 6, and 8, indicates the role of work in providing broader life significance. The Greater Good Motivations score, modified to include questions

5 and 10 due to the removal of question 9, assesses the extent to which individuals believe their work benefits others or society. In this study these Greater Good Motivation questions focused on whether waste works serves an important purpose and makes a positive difference in the world.

The total score, with a maximum of 45, gauges the overall meaningfulness of work. Lower scores on these scales may indicate a lack of work meaning, potentially leading to negative work-related outcomes like poor engagement, low organizational commitment, and a perceived lack of support from leadership.

4.9.2) Social Capital:

Social capital, an essential concept referring to the network of relationships, norms, and trust that allows individuals and communities to coordinate efforts towards shared goals (Putnam, 1995), plays a crucial role in achieving diverse societal outcomes, such as economic growth, political stability, and health improvement (World Bank, 2019). The researcher intended to investigate whether engagement in the ZTL project impacted participants' appreciation for their community and environment, influenced their sense of belonging, and altered their self-efficacy and overall mental well-being. These aspects are necessary when assessing the broader social and psychological effects of community-driven initiatives such as ZTL and their potential to bolster social capital and formed the foundation for formation of questions surrounding social capital.

4.9.3) Financial Capital:

Existing literature on sustainable livelihoods underscores the versatility and adaptability of financial capital, citing its readiness for acquisition and disposal (DFID, 1999). Additional research (Adato and Meinzen-Dick, 2007; Ellis, 2000; Hulme and Mosley, 1996) emphasizes the ability of financial capital to purchase other forms of capital or services and equip households to tackle shocks and stresses. Adato and Meinzen-Dick (2007) further suggest that evolving structures and processes, including legal and regulatory environments, access to financial services, and economic development levels, significantly affect individuals' capacity to access and deploy financial resources. Questions were based around access to food and education, the ability to be resilient to stressors and shocks such as unexpected illness and changes experienced in financial goals and stability.

4.9.4) Physical Capital:

Physical capital, consisting of crucial infrastructure and productive goods like affordable transportation, safe housing, sufficient water supply, sanitation, cost-effective clean energy, and information access, plays an instrumental role in sustaining livelihoods (DFID, 1999; Scoones, 1998). The influence of physical capital on livelihood viability is best understood through the lens of

opportunity costs or 'trade-offs.' Insufficient infrastructure can impede education, access to healthcare, and income generation (Ellis, 2000; Sen, 1999). The interconnectedness of physical and financial capital raises similar considerations, such as access to electricity, transport, and tools facilitating daily chores like washing machines (World Bank, 2009). Questions were formed around access to transport, electricity as well as work infrastructure, tools and machinery.

4.9.5) Environmental Capital:

The concept of environmental or natural capital refers to the Earth's stock of natural resources that provide essential goods, flows, and ecological services necessary to support life. This includes a wide range of elements such as, water, air quality, arable land, habitat, erosion control, biodiversity, and more (O'Keeffe et al., 2022). In terms of rural and urban development, the sustainability of natural capital is critical. For example, land, water, soil, trees, and genetic resources are integral to enhancing both rural and urban development. Initiatives like the Food Security Integrated Program work with small-scale farmers to sustainably increase yields, which in turn supports food security, land health improvement, and carbon sequestration. This approach is essential for poverty reduction, especially among the poorest populations and women (GEF, 2015). Although land access is significant in rural settings, this study focuses on urban contexts and thus emphasizes behaviours impacting environmental sustainability and health rather than land access. These behaviours incorporate practices like recycling and gardening, alongside the personal perspectives held by participants about waste disposal or waste as a resource.

4.10) Ethnographic research

Before administering the questionnaire, the researcher employed various ethnographic methods to engage with the Zero to Landfill (ZTL) project participants and management. An initial meeting with the Zero management team in September 2022 established a foundational understanding of the project and rapport with the team, a key element in ethnographic research (Neyland, 2007).

In October 2022, the researcher participated in two voluntary sessions with the collection team, embodying ethnographic practices of trust-building and understanding (Pink & Morgan, 2013). These sessions involved working alongside the team, using bicycles with rear trailers for transporting recyclables, providing insights into the organizational and physical aspects of the work.

Further voluntary sessions were conducted before the five capitals interview, particularly important as many participants were new and unfamiliar with the researcher. These sessions included involvement in composting activities (Fig. 7,8 & 9) with the head gardener, enhancing the researcher's hands-on

experience and understanding of the process, as well as facilitating rapport re-establishment with new members, in line with contemporary ethnographic practices (Collins, 2020).

The researcher also attended several management meetings, gaining insights into organizational dynamics and challenges faced by the team. This participation ensured a comprehensive understanding of the project's operational context (Neyland, 2007).

Overall, this approach aimed to foster individualized engagement and comfort among participants and management, enhancing the quality of responses in subsequent interviews and reflecting the ethnographic emphasis on understanding individual experiences within their socio-cultural contexts (Tucker & Tischler, 2019).

Figure 7: Shredder (Source: Impson, 2023)

Figure 8: Shredded organic waste being collected for cages (Source: Impson, 2023)

Figure 9: Wire cages being used to assist in breakdown of organic matter (Source: Impson, 2023)

4.11) Study group:

Initially, the study intended to conduct two rounds of interviews with the 15 part-time participants. These interviews were planned to take place at the start of the project and near its completion. The aim was to get a baseline score for participants prior to their involvement and a second score towards the projected end of the project nine months later to gather impacts that had transpired during their participation. Due to time constraints and personnel turnover the two interviews that were conducted were not based on the same questions. The reasoning and methodology are discussed below.

The initial interview, which included all 15 initial participants covering diverse responsibilities such as collection, sorting, composting, and gardening, took place three months after the commencement of the project. This session, originally designed as a means of evaluating progress, was subsequently modified for research purposes by incorporating relevant study-related questions. The inquiries, developed by the acting manager and the researcher, centred on factors such as satisfaction and

teamwork. It should be noted that at this time, the Sustainable Livelihood Framework and the emphasis on the five capitals had not been utilised as the theoretical framework. As a result, the questions asked were more general in character, focusing on the overall impact of the participants' involvement.

After the framework was chosen and the five capitals questionnaire was prepared and ready to be conducted eight months into the project, several participants had departed while new participants had joined. Only 11 participants possessed enough project experience to provide suitable responses to the questions. In addition, three new recruits were questioned using customised questions to assess their expectations and knowledge of waste management procedures. Further interviews were conducted with the head gardener, site owner and management to obtain information from their viewpoint.

None of the participants were native English speakers, speaking either Afrikaans or Xhosa. Therefore, the Five Capital questionnaire was translated into both languages for better comprehension. Some participants, facing literacy challenges, received assistance from multilingual co-workers during the questionnaire. A detailed summary of the interviews conducted is available in Table 2.

Table 2: Table of data collection methodology

Date:	Data Collection:	Study group:	Conducted by:
December 2022	Check-in interviews o Appendix 8	15	One acting manager and researcher
May 2023	Five Capital interviews done in tandem with a questionnaire o Appendix 1,2 & 3	11	Researcher
May 2023	Semi-structured interviews with management o Appendix 5	2	Researcher
May 2023	Semi-structured interviews with new participants o Appendix 6	3	Researcher
June 2023	Semi-structured interview with site	2	Researcher

	owner and head gardener ○ Appendix 7		

4.12) Research Method:

The December check-in questionnaire, a joint effort by a manager and the researcher, featured eight questions aimed at understanding participant concerns, suggestions for improvement, and their perceptions of the project's impact. Key areas like work satisfaction, teamwork, and pride were scored. These responses, manually recorded, were thematically analysed and categorized according to relevant capitals, ensuring accuracy through participant verification.

Additionally, a semi-formal interview (Five Capitals) comprising a questionnaire (Appendices 1, 2, and 3) was conducted with each participant. Appendix 1 and 2 utilized a Likert scale (1-5) for quantitative assessment, focusing on changes related to the five capitals. These scores were instrumental in creating visual tools like amoeba diagrams and bar graphs. A set of open-ended questions in Appendix 3 provided qualitative insights, complementing the quantitative data.

Interviews with two of the three acting managers of the Zero to Landfill (ZTL) project were also conducted, offering a multi-dimensional perspective on the project's impact. These interviews focused on evaluating changes in the five capitals among employees and examining the project's role in providing employment opportunities and altering perceptions of waste management. Details of these management interviews are included in Appendix 5.

4.13) The analytical procedure:

The analysis for this study was multi-faceted, aimed at interpreting and analysing data from questionnaires and interviews in a systematic and rigorous manner.

Initially, responses from the December check-in were logged into a spreadsheet, with work satisfaction, teamwork, and sense of pride scores calculated. Longer, qualitative responses were then analysed and coded, assigning labels to segments that related to specific themes like skills acquisition or financial strains. These responses were color-coded for ease of organization, allowing for efficient sorting and analysis. This process culminated in grouping the responses under the framework of the five capitals, setting the stage for comparison with subsequent semi-formal interview data.

The second step involved the quantitative analysis of Likert scale responses. These were visually represented through amoeba diagrams and bar graphs, illustrating potential impacts on the five

capitals. Scores from the questionnaires were standardized, plotted on the amoeba diagrams, and connected to form an amoeba shape, visually depicting the data. These results, along with the bar graphs, were presented in tables and figures to identify trends and patterns.

Thirdly, open-ended questionnaire responses from the five capital interview, recorded via mobile device, were transcribed using the Cockatoo program. Ensuring accuracy, these transcriptions were revisited and thematically coded, identifying recurrent themes relevant to the five capitals. These themes were then quantified and tabulated, indicating the frequency of each theme's occurrence. A comparative analysis was also conducted, especially significant due to staff turnover between the initial interview and questionnaire administration. This comparison focused on employee satisfaction, with data organized into a table and a graph for a clear visual comparison over time.

The fourth step involved a comparative analysis of the collected interview and questionnaire data. This method examined changes or differences between initial and final data, contrasting December interview data with five capital questionnaire responses to discern trends or shifts in participant experiences and perspectives.

Interviews with new participants, the site owner, head gardener, and two managers, were also recorded and transcribed. Given word limit constraints, only the most relevant data to the study's aims and objectives were included in the analysis.

Finally, the study's findings were discussed in relation to its aims and objectives, alongside existing literature. This discussion aimed to draw conclusions about the project's impact on the five capitals and the community recyclers' well-being, ensuring that the research's conclusions were grounded in the data analysis.

Conclusion

In conclusion, the methodology chapter has detailed a robust framework for investigating the socio-economic impacts of the ZTL project through the lens of the Sustainable Livelihood Framework. The combination of quantitative and qualitative approaches, including structured questionnaires and semi-formal interviews, facilitated a thorough exploration of the five capitals and their interplay in enhancing or impeding the participants' livelihoods. The study's multi-dimensional methodology not only underscores the complexity of sustainable livelihood studies but also enhances the reliability and depth of the findings, contributing valuable insights into the dynamics of community-driven waste management initiatives. This rigorous methodological approach ensures that the study's outcomes are well-founded and reflective of the diverse experiences and perceptions of the participants, providing a solid foundation for future research and practical applications in similar contexts.

Chapter 5: Results

5.1) Introduction:

This study provides an in-depth analysis of the socio-economic impacts stemming from participation in the Zero to Landfill (ZTL) initiative, with a central focus on its potential to enhance livelihoods through the Sustainable Livelihood Framework (SLF) and its five capitals, especially emphasizing human capital. The results section delves into the December Check-in interviews, showcasing scores for work satisfaction, teamwork, and pride as well as a breakdown of the thematic analysis that was done to group and assess responses. A summary of impacts is provided as well as negative experiences the participants mentioned.

Following that employee satisfaction was compared over time for the participants who were present at both the December check-in and the Five Capitals Questionnaire. Table 6 and Graph 1 are provided for visual analysis. The responses to the Five Capital Questionnaire are then analysed, starting with the scores for the WAMI inventory. That is followed by Table 8 and Graph 2 which show the total scores each participant got for the Likert style questions that were used in the questionnaire. These scores were used to create the amoeba diagrams. The highest and lowest participant scores are compared using the amoeba diagrams.

Subsequently, an examination of the amoeba diagrams and bar graph illustrate participants' varying impacts, accompanied by a comprehensive thematic analysis of longer questions related to each capital. Insights from newcomer interviews, dialogues with the head gardener and site owner, and feedback from two acting managers are then explored to identify emerging themes. The section culminates by highlighting key findings, setting the stage for the ensuing discussion segment.

5.2) Quantitative Analysis of the December Check-in Interviews:

Three months post-project initiation, check-in interviews were conducted to gauge short-term impacts. Table 3 presents participant scores for work satisfaction, teamwork, and sense of pride, all rated on a 10-point scale. "Sense of pride" had the highest average of 8.3, followed by "teamwork" at 7.38, and "work satisfaction" at 6.93. Some participants did not provide responses for certain factors, which may have skewed the results. Notably, sense of pride was highest, with nine of the 12 respondents scoring over eight. However, one participant scored as low as two, suggesting varied experiences. Most participants, 10 out of 13, rated teamwork seven or above, with five giving a perfect score. Although work satisfaction had the lowest average, five participants rated it a perfect 10, while seven scored it five or below, indicating diverse sentiments.

Table 3: Work Satisfaction, Teamwork & Sense of pride

	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	P14	P15
Work satisfaction	7	4	5	8	10	10	10	5	3	5	10	7	5	10	5
Teamwork	7	10	2	?	2	?	10	8	10	7	7	10	10	6	10
Sense of pride	10	5	2	?	?	?	10	10	5	8	10	8	9	10	8

5.2.1) Qualitative Analysis of December Interviews -Short term impacts

The interviews with the participants offered an understanding of their experiences while engaged with ZTL from the start of the project in September (2022). Thematically, these dialogues illuminate the nature of the participants' work roles, their perceptions of the work milieu, and the personal development they've encountered since their initiation into the project. The breakdown of the short-term impacts is to follow. The participants responses were grouped into impacts related to the five capitals and are detailed below.

5.3) Unpacking the five capitals:

5.3.1) Human Capital:

P#1 gained skills in shredding and showed an enthusiasm to delve deeper into composting. Similarly, P#4 has garnered knowledge in composting and recycling. On the other hand, P#3 amplified his driving skills through waste collection, and P#10 applied her prior knowledge in aluminium work, emphasizing the project's role in fostering skills transfer. Alongside these, the development of soft skills was evident. P#7 highlighted the enhancement of interpersonal skills from interactions during waste collection, and P#9 experienced dual advantages—improved physical fitness and an enriched understanding of local roads while conducting collections.

Beyond skill development, the project ignited an inclination towards continuous learning. For instance, P#11's budding interest in horticulture suggests the initiative's ability to spark enduring curiosity. Many, like P#1, P#7, and P#9, credited the project with boosting their physical health, whether through the project's rigorous demands or specific tasks like bike operating. Moreover, the project's

influence wasn't limited to physical health. P#8 shed light on the project's contribution to mental wellness, emphasizing the improved social interactions and community connections they experienced.

5.3.2) Physical capital:

Several participants, including P#10, P#14, and P#15, grappled with the challenge of reaching the worksite, while others, such as P#1, P#5, P#7, and P#13, faced logistical issues executing their tasks, often covering vast distances on foot or by bike. This occasionally resulted in tardiness and hindered role fulfilment. Another issue revolved around the working conditions. A substantial group, including participants P#4, P#8, and P#15, lamented the absence of shade, with others like P#7 highlighted the physical effort of handling cumbersome loads during collections. These circumstances underscore the need for amenities like shaded workspaces and refined load management strategies. Further compounding these concerns is the evident dearth of adequate equipment. Participants P#1, P#5, and P#13 vocalized the pressing need for superior bikes and supplementary equipment, such as shredders or trolleys, positing that such enhancements could substantially bolster productivity and, consequently, elevate job satisfaction and potential earnings.

5.3.3) Social Capital

The impact of the project on participants' social capital was obvious yet varied. A consensus emanated from participants such as P#1, P#3, P#8, and P#13, accentuating the pivotal role of effective communication and the unanimous aspiration for its enhancement to fortify teamwork quality. Equally, commitment emerged as an important aspect warranting improvement as a number of participants mentioned that a lack of commitment from certain participants was affecting teamwork and work efficiency. The scope of interpersonal relations and team dynamics was rich and varied, with P#4 likening colleagues to family. This is contrasted against the frustrations articulated by P#10 and P#11 regarding disparities in work ethic and attitudes within the team. This diversity underscores the imperative of adept management of team dynamics to cultivate a harmonious and productive work ambiance. Additionally, the theme of role fulfilment and accountability was brought to the fore by P#3, P#6, and P#11, spotlighting instances of unmet responsibilities and the resultant negative implications on team performance and job satisfaction, signalling a call for heightened accountability. Lastly, the proposition for structured interventions such as team-building activities and training workshops by P#5 and P#8, highlighted a desire for initiatives in the workplace aimed at fostering social cohesion and facilitating knowledge exchange, thereby enhancing the project's impact on social capital.

5.3.4) Financial capital

The project's impact on participants' financial capital highlights a nuanced interplay between immediate fiscal relief and the quest for long-term economic stability. Participants #5 and #11 notably underscored the transitory nature of their involvement with ZTL, viewing their engagement as a provisional measure that furnishes short-term income while the pursuit for more secure and lucrative employment persists. This sentiment unveils a prominent concern regarding the project's capacity to offer long-term financial sustainability and job security.

Concurrently, Participant #11 articulated dissatisfaction with the remuneration level despite deriving enjoyment from the work, exemplifying a scenario where the project's wage structure might not fully satiate the financial aspirations of some participants, thereby influencing their job satisfaction and allegiance to the project. Further enriching this financial narrative, Participant #7 envisaged the potential of business growth and client acquisition as viable avenues to augment financial capital, signalling a collective aspiration for the project's expansion to foster enhanced income levels and address the underlying concerns of economic stability.

5.3.5) Environmental Capital:

In terms of environmental awareness the participants expressed their newfound understanding of recycling and environmental sustainability. Participant #8, for instance, expressed a sense of pride in sharing recycling knowledge within her community, marking a pivotal stride in environmental stewardship. This newly acquired environmental literacy serves as a linchpin for fostering awareness and empowering participants to make substantive contributions to environmental conservation as individuals and potentially as a community.

5.3.6) Conclusion of Impacts

Four participants, including P#1, P#2, P#10, and P#11, reflected on significant personal growth and transformative behavioural changes, highlighting developments ranging from increased motivation and mental strength to refined social skills and a more humble and thoughtful approach to problem-solving. The responses included aspects of mental well-being, with P#5 noting the alleviation of boredom and P#10 identifying the project's engagement as a deterrent from negative influences such as substance use, underscoring the project's therapeutic potential.

Furthermore, a sense of pride resonates in the reflections of Participants P#1 and P#10, indicative of enhanced self-esteem and job satisfaction. Participants P#1 and P#8 further echo the sentiment of enhancement as they observed discernible improvements in physical fitness, underscoring the project's holistic impact on health. Finally, the theme of community connection and social skill development emerged prominently, with Participants P#8, P#11, and P#13 narrating experiences of

enriched social lives, a deepened understanding of community dynamics, and polished communication skills.

Despite the numerous positive outcomes, the participants' experiences in the ZTL project were not devoid of challenges. Participants P#2 and P#12 were vocal about their concerns regarding poor communication, with the former expressing feelings of being undervalued and unheard, indicating a potential detriment to participant satisfaction and engagement. This was further compounded by shared experiences of dissatisfaction with unclear policies and abrupt changes, particularly concerning payment and work hours, fostering a climate of uncertainty within the workplace. Participant #12's account of perceived inequity and double standards from management further added a layer of complexity to the narrative, potentially undermining teamwork, collaboration, and overall job satisfaction, as evidenced by the notably low teamwork scores of 2/10 by Participants P#3 and P#5. The expression of dissatisfaction was also echoed by Participants P#2 & P#9, who rated their overall experience at a mere 4/10 & 3/10 respectively, suggesting unmet expectations and needs adversely affecting their motivation and satisfaction.

5.4) Responses to the Five Capitals Questionnaire:

5.4.1) Human Capital

Work Satisfaction:

Work satisfaction received low scores overall with only two participants scoring either satisfied or very satisfied compared to the five who scored unsatisfied or very unsatisfied. The remaining four participants scored indifferent, showing that their involvement had no effect on their satisfaction. The reason behind these scores become evident when analysing the longer responses to the questionnaire and are unpacked in the discussion section.

Table 4: Satisfaction scores from Five Capital Questionnaire

P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11
4.4.	4.6	8.6	5.4	3.6	2.6	2	6	6.2	6.4	7.2

Key: 2-3.6 very unsatisfied/3.6-5.2 unsatisfied/5.2-6.8 indifferent / 6.8-8.2 satisfied / 8.2-10 very satisfied

Comparison of employee satisfaction over time

Among the 15 individuals who were interviewed in December, a mere five participants remained actively engaged at ZTL at the time of the Five Capitals Questionnaire, which was administered five

months after the December session. This data indicates a 66% turnover rate among staff members within that specified period. Regrettably, none of the departing staff members were contacted for the purpose of ascertaining the precise reasons for their leaving. Consequently, any analysis about the direct cause of their departure can only be speculative in nature.

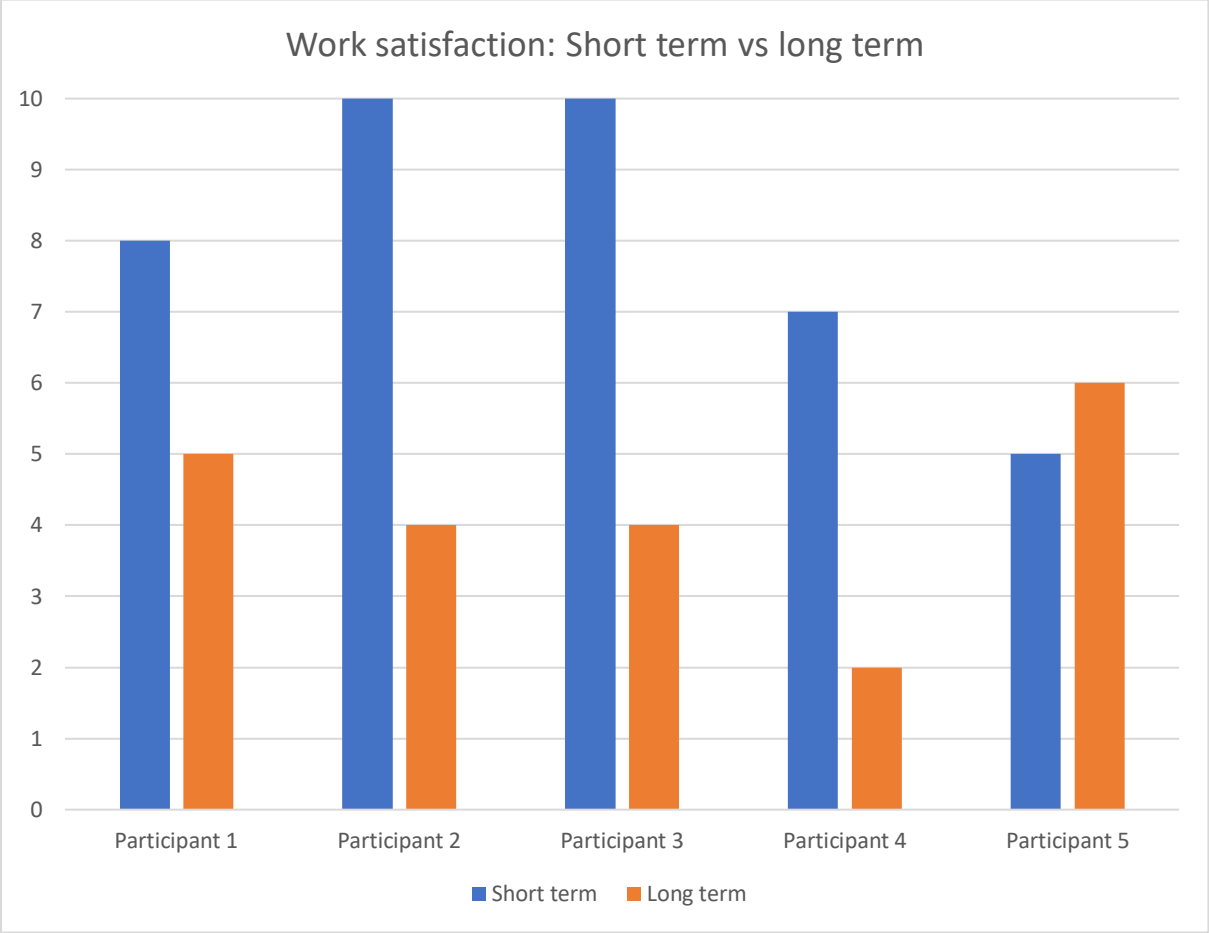
In Table 4 and Graph 1 the participants have been allocated numbers (1-5) for ease of understanding but were named differently in the December interview and Five Capital Questionnaire due to the staff turnover that took place. Participant 1 scores come from P#4 in the December interview and P#4 in the Five capital questionnaire. Participant 2 (P#6/P#1), Participant 3 (P#11/P#5), Participant 4 (P11/P5) and Participant 5 (P#12/P#7).

A discernible parallel can be established between the recorded work satisfaction scores seen throughout both interview sessions. The subsequent table provides statistics for the five individuals, followed by a graph to facilitate visual representation. In the context of this research, the short-term impacts are defined as occurring within a period of 2-3 months following the initiation of the project, while the long-term effects are defined as manifesting throughout a timeframe of 8-9 months.

Table 5: Work satisfaction comparison between two interview sessions

Satisfaction Scores /10	Participant 1 (4/4)	Participant 2 (6/1)	Participant 3 (11/5)	Participant 4 (12/7)	Participant 5 (13/9)
Short term	8	10	10	7	5
Long term	5	4	4	2	6
Change	37.5%	60%	60%	71%	20%

Graph 1: Bar graph showing short term vs long term changes in satisfaction



Overall it is clear that out of the five participants there is a general downward trend in work satisfaction with three participants experiencing a large deterioration (P2, P3, P4), one a noteworthy deterioration (P1) and one a slight improvement (P1). These changes are detailed in Table 4 and are further explored in the discussion section.

Analysis of the WAMI Scores of ZTL Participants

The Work and Meaning Inventory (WAMI) is an established metric that evaluates the extent to which individuals derive meaning from their work. The scores generated from the WAMI spans three core domains: positive meaning, meaning-making through work, and the greater good. These domains offer insights into how workers perceive the significance of their work, how they derive purpose through their employment, and the degree to which they believe their tasks contribute to the broader societal or greater good. Herein, we analyse the results of 11 participants who completed the Five Capital Questionnaire. These scores are detailed below in Table 6.

Table 6: Meaningful work scores (WAMI)

Participant	1	2	3	4	5	6	7	8	9	10	11		Average	%
Positive Meaning (/20)	18	12	18	12	9	9	10	17	17	14	18	**14**		**70%**
Meaning-Making through Work (/15)	15	8	13	9	5	9	3	13	14	14	14	**10,63**		**71%**
Greater Good Motivations (/10)	10	8	10	5	2	8	7	9	10	9	9	**7,90**		**79%**

Positive Meaning Score (7/10): This score reflects that the majority of participants perceive their work as personally meaningful and significant. It indicates that they see their roles within the ZTL project as contributing to their sense of purpose and fulfilment, viewing their daily tasks as more than just routine activities but as meaningful endeavours.

Meaning-making through Work Score (7.1/10): This score suggests a strong connection between the participants' work and their personal or existential goals. It implies that the participants not only find their work inherently valuable but also view it as an integral part of their broader life's narrative and purpose.

Greater Good Score (7.9/10): The high score here indicates that participants overwhelmingly believe their work positively impacts society or the environment. They likely perceive their efforts in recycling and waste management as contributing to broader goals like environmental conservation, sustainability, or community well-being.

Overall Implications: With a total WAMI score of 32.5 out of 45, translating to an average of 72.2%, the findings suggest that the ZTL team, on average, finds their work meaningful. This high level of perceived meaningfulness can lead to greater work engagement, motivation, and satisfaction, potentially resulting in increased productivity and lower turnover rates. However, it's important to acknowledge that some individuals, particularly participants 4 and 5, reported lower levels of meaning from their work. This variation highlights the need for management to address individual differences in job satisfaction and engagement within the team. Such disparities might impact team dynamics and overall project efficacy, underscoring the importance of tailored management approaches to ensure each team member finds value and purpose in their work.

5.5) Likert Question responses to other capitals:

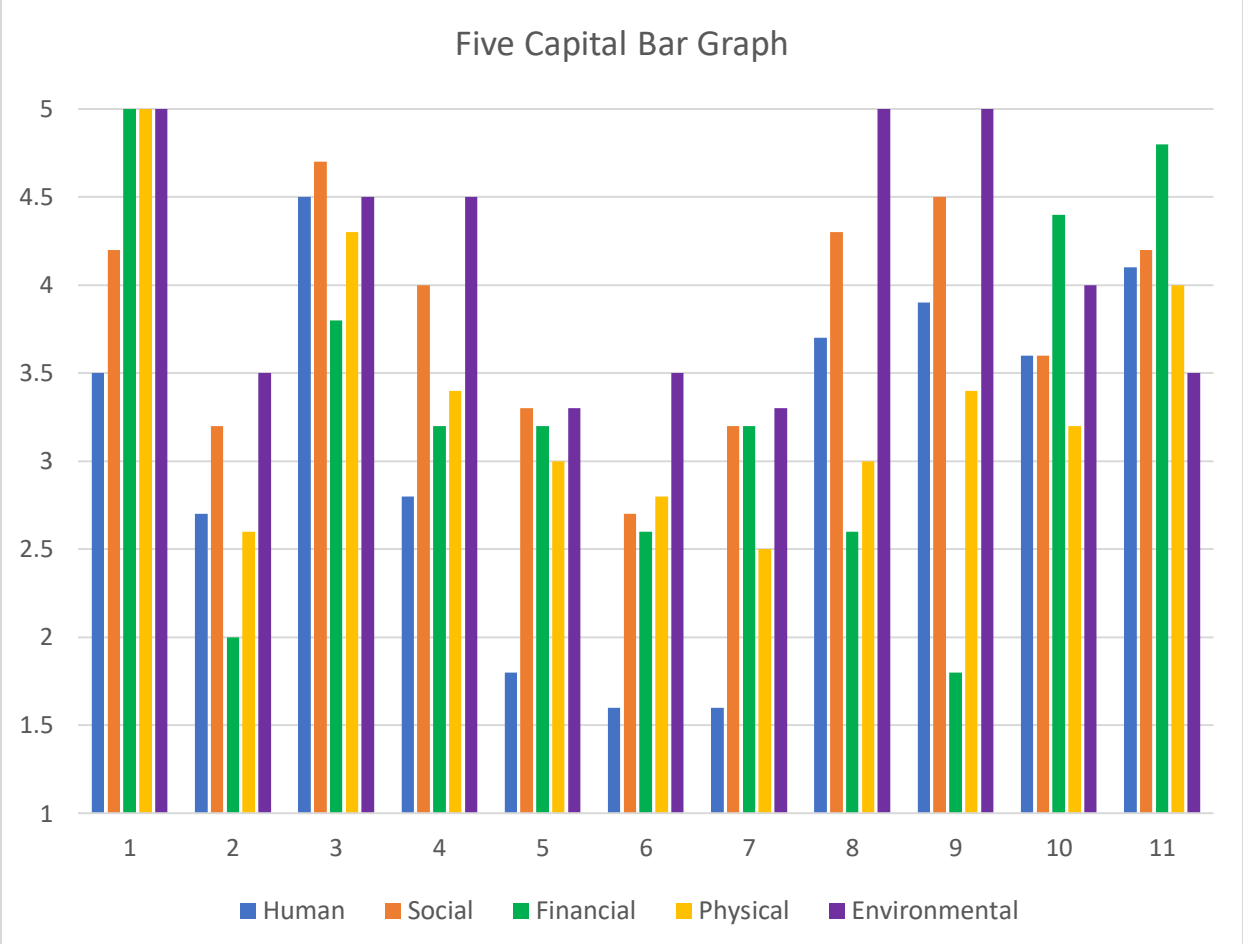
The subsequent part presents the outcomes pertaining to the Likert scale inquiries for the five capitals. Graph 2 has been employed to depict the responses provided by each participant. Each

capital city was assigned a set of questions, each of which was scored on a scale of 1 to 5. The results were subsequently averaged in order to provide a score for each capital. The comprehensive compilation of inquiries utilised is available for reference in Appendix 2. The data used to compile the graph came from table 10 in the Appendix. The table is a summary of information taken from responses to the Likert questions for each capital.

Five capital Bar Graph:

Graph 2 illustrates the scores that each participant recorded. On the x-axis is the range of scores from one – five. The y-axis contains the list of the 11 participants.

Graph 2: Scores for the Five Capitals



It is clear that human capital (blue) scored the lowest among participants and environmental capital (purple) scored the highest. Although participants saw changes in Human Capital through skill building and knowledge growth the score was compiled using the WAMI and satisfaction scores. Participants rated the work and meaning (table 5) fairly high as can be seen in the overall average of 72%, however

the satisfaction scores (table 6) among participants were generally low with an average of 52% bringing the Human Capital score down.

Some participants experienced overall improvements in all capitals such a P#1, P#3, P#11. Others experienced improvements in some capitals but no major negative impacts such as P#4, P#8 & P#10. On the other hand, P2, P5, P6, P7 experienced negative impacts in either human, financial or physical capital and little to no change in social or environmental capital. P#9 saw mostly positive impacts especially in environmental and social capital yet human and physical capital saw improvement to a lesser extent but financial capital saw a negative impact.

5.6) Comparison of largest and smallest impacts between participants

In this section three amoeba diagrams are presented to show the contrast in impacts that was experienced between participants. According to the Likert data the project had the most positive impact on the capitals of participant 1 and saw the lowest and in some cases negative impact on participant 6.

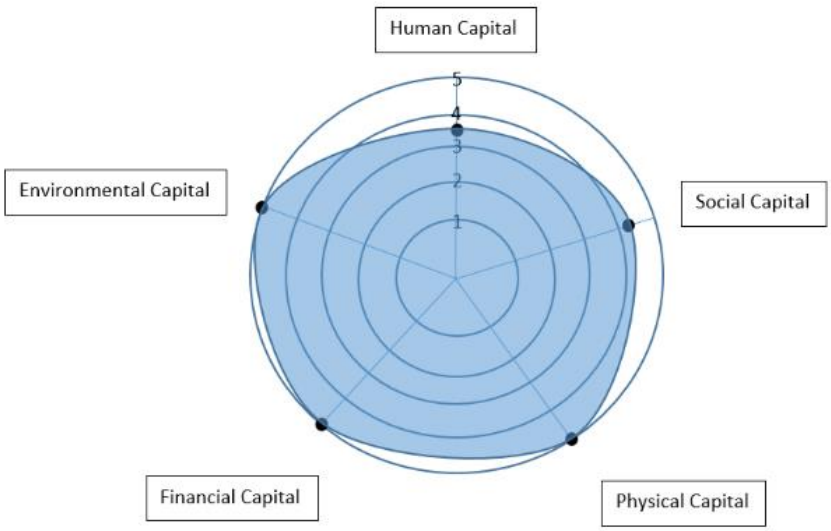


Figure 10: Amoeba diagram of participant #1

Participant #1 achieved a highest score of 5 out of 5 in three out of the five capitals, which was the highest out of all participants. This indicates significant progress in these areas based on the Likert

scale questions. The social capital score slightly exceeds four, while the human capital score falls just below four. Both scores indicate that there have been advancements in both forms of capital, but to a lesser degree compared to the other three capitals.

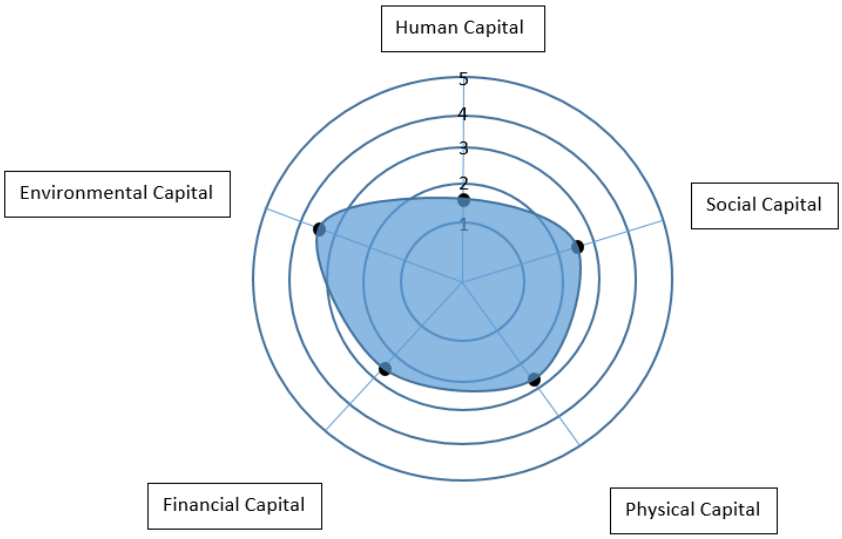


Figure 11: Amoeba diagram of participant #6

Participant #6 obtained the least favorable scores among the 11 individuals. Among the capitals assessed, environmental capital exhibited a score proximate to (3,5), indicating a negligible to modest improvement in this particular capital. The scores for social, financial and physical capital all hovered between two and three, indicating a range from minimal to no change to a slight decline in these domains for the individual, whereas human capital received a score of 1.6 indicating a small to large decline. These results will be further discussed and explained in the discussion section.

5.7) Open-ended question analysis:

The following section is related to the longer questions that were answered in the Five Capitals Questionnaire. Table 9 is shown below to present the themes that were recognised as well as the occurrence of mentions among the participants. It is a compilation of the most mentioned themes, taken from the complete table (Table 10) in the Appendix. It will be followed by an analysis of the

significant impacts that were identified by the participants based on each capital. Notable remarks were gathered and grouped into representative themes.

Table 9: Occurrence of themes mentioned during the Five Capital Questionnaire

Capital and Theme	Number of mentions
Human Capital	
Skill Development and Self-Sustainability	5
Motivation through Skill Development and Leadership	4
Social Capital	
Improved Co-worker Relationships	9
Positive Recognition from community	6
Financial Capital	
Positive Impact on finances	5
Neutral stance on long-term planning	5
Physical Capital	
Limited financial capacity to improve access to electricity & transport	4
Increased food spending	4
Environmental Capital	
Increased Environmental Awareness and Practical Application:	9
Improved waste management at home	5

5.7.1) Human Capital

Professional Growth and Skill Acquisition:

A significant portion of participants (5 out of the total) reported acquiring practical skills, notably in gardening and recycling. This is exemplified by one participant's testimony: *"My work has helped me a lot because I now know how to grow my own vegetables''*. However, the benefits of the project were

not uniformly experienced. For some participants, the role served primarily as a financial resource, with future aspirations diverging from waste management. This sentiment is captured in the statement: *"The salary I'm getting here, I'm saving. And those savings will be later used to do the courses I need to do in order to become a security guard."*

Community Engagement:

The project spurred significant community engagement among participants. Several of them either initiated or considered starting community projects, as evidenced by one participant's remark: *"I have started a gardening project in my community and we collect kitchen waste."*

Environmental Sustainability Awareness:

Participants reported a substantial increase in their awareness of environmental sustainability due to their involvement in the ZeroToLandfill project. This was characterized by a shift in perception, as one participant noted, *"Waste is now seen as a resource."* The impact of this heightened awareness transcended theoretical knowledge, leading to practical applications in participants' everyday lives. For example, a participant shared, *"I have now started doing recycling at home, where before I was just throwing things away."* There was also a reported increase in understanding the economic value of waste, with remarks such as *"The value of certain waste types is now clearer."* However, some participants did not experience a significant change in their views on environmental sustainability.

Job Satisfaction and Motivation:

The project's influence on job satisfaction and motivation among participants was diverse. While some felt more motivated due to skill development and potential leadership roles *"I'm happier now. Because now I can be a leader",* others expressed dissatisfaction stemming from unmet expectations and poor working conditions. Financial constraints were a notable factor affecting the overall contentment with the job. Additionally, the dynamic nature of the work environment, including aspects like team expansion, had varied effects on participants' job satisfaction. Interestingly, despite facing internal challenges, a subset of participants exhibited a passion for the waste management industry, as highlighted by one participant's statement: *"Except for internal politics and unfavourable work conditions I love this industry."*

5.7.2) Social Capital

Workplace Relationships:

A notable proportion of the participants reported enhanced relationships with their co-workers, fostering a sense of camaraderie and a *"family-like"* atmosphere in the workplace. Participant #5 exemplified this sentiment: *"My co-workers have a great relationship, and mostly we are like a family here."* This indicates a positive social environment within the organization, characterized by strengthened bonds and trust among colleagues.

Community Engagement and Impact:

Beyond the workplace, the project facilitated significant community engagement for some participants. For example, Participant #11 highlighted their role in aiding community members to find employment: *"I've directly impacted these people's lives by giving them an employment opportunity."* This reflects the project's contribution to fostering community connections and generating positive community outcomes.

Environmental Awareness and Behavioural Change:

The project was instrumental in elevating participants' environmental sustainability awareness, leading to notable behavioural changes. Many participants became more conscientious about recycling and waste management. Participant #11's statement, *"Where I used to just throw things on the floor, now I know that there is a specific bin for different types of waste,"* is indicative of this shift. Additionally, this increased environmental consciousness extended beyond personal habits, with participants like #4 using their knowledge to empower their communities: *"It has helped a lot because I can now show my community how to grow their own plants (vegetables), and this can bring in income for them."*

Personal Reputation:

Participants experienced varying impacts on their personal reputation. Many received positive recognition within their communities, with their roles and contributions being acknowledged and respected. Participant #8's experience highlights this positive shift: *"Home gardening project has started after working at ZTL, and the community is aware of my work which has improved my reputation."* However, the impacts on reputation were not universally positive. Some participants noted mixed or even negative effects on their personal reputation. One participant noted that as a musician, spending less time making music and bringing in an income through other avenues has had

negative impacts, suggesting a nuanced and varied impact of the project on individuals' standing within their communities.

5.7.3) Financial Capital

Immediate Financial Impact:

The project yielded mixed results on participants' immediate financial situations. Participant #1 noted the ability to *"contribute to the household,"* reflecting a positive effect. Similarly, Participant #11 appreciated the structured savings, saying, *"has assisted me to pay for a food hamper where you pay a monthly fee of 250 Rand a month and at the end of the year you get a 3,000 Rand food hamper."* Contrarily, some participants faced financial challenges, particularly with transportation costs. Participant #4 mentioned higher *"minibus taxi fare,"* while Participant #7 experienced decreased *"financial stability due to transport costs. Taxi sometimes cost me R100 per day."*

Income Sufficiency and Household Expenses:

Despite the income aiding in covering some expenses, Participant #5 indicated that it was not substantial, saying it helps with some household expenses but is still not enough.

Long-Term Financial Goals and Outlook:

The project had varying influences on participants' long-term financial plans. Participant #1 expressed hope in saving, stating they could *"save some money for the future."* In contrast, Participant #9 saw an opportunity for personal brand growth "through waste management and spreading education." However, not all participants saw a change in their financial aspirations. Participant #4 specifically pointed out the inadequacy of their income for long-term planning, calling the pay *"too little"* for efficient planning. Five participants mentioned that their work in waste management had not influenced their long-term financial goals or plans. This could be due to either a lack of change in their financial circumstances or the fact that the job is not in line with their long-term career or financial aspirations.

5.7.4) Physical Capital

Accessibility to Transportation, Housing, and Energy:

The impact on participants' access to transportation and other physical capital resources varied significantly. For instance, Participant #1 experienced improved affordability in transportation, stating, *"We can afford it now."* Proximity to the workplace emerged as a benefit for some, as Participant #3

noted, *"I live very close to work so I have no transport costs."* Participant #11 highlighted broader advantages, mentioning assistance with *"purchasing electricity and transport"* and supporting their daughter's school commute. In contrast, others faced ongoing financial challenges. Participant #4 expressed that their earnings were *"too little for the living expenses,"* and Participant #8 struggled with debts, often linked to transportation costs.

Spending Habits and Daily Necessities:

The participants' incomes were primarily used for day-to-day necessities. Participant #1 indicated, *"My income is used for day-to-day needs,"* and Participant #3 reported spending more on *"food and maintaining the family."* Changes in food purchasing were noted, with some increasing their food buying while others, like Participant #4, adjusted their food choices based on resources from the community garden. Despite these variations, several participants saw minimal changes in spending behaviours, with some experiencing budgetary constraints, especially due to transport costs.

Bulk Buying and Monthly Grocery Planning:

Participant #11 provided an optimistic perspective, noting a shift to bulk buying, which allowed for *"monthly grocery purchases"* and surplus food at the month's end.

Workplace Conditions and Opportunities for Improvement:

Concerns about workplace conditions, such as the lack of sanitation supplies as mentioned by Participant #6, indicate potential areas for improvement in the project.

5.7.5) Environmental Capital

Increased Environmental Consciousness and Practical Application:

The project significantly raised environmental awareness among participants, with 9 respondents noting an enhanced understanding and practical application of ecological principles. Participant #4 experienced a shift from perceiving the job as routine to embracing new practices like *"gardening and growing my own food."* Participant #1 started *"recycling and gardening at home,"* showcasing the transition from awareness to action.

Expansion in Waste Management Knowledge:

Participants' understanding of waste management broadened, as Participant #2 acknowledged learning about *"recycling and organic composting."* Participant #10 observed a community ripple effect, noting that *"some people in my neighbourhood have now started collecting cans."*

Evolution of Values towards Environmental Stewardship:

The project influenced participants' values regarding waste and its utility. Participant #5 stated, *"It has influenced it in such a way that now I know that everything is useful no matter how dirty it is."*

Impact on Personal Habits and Community Advocacy:

Participants' personal habits evolved, with some becoming environmental advocates within their communities. Participant #1, for instance, began teaching *"neighbours and family about recycling."* Tangible steps towards reducing waste were taken by participants #3 and #7, who incorporated composting practices into their routines. Participant #11 adopted a holistic approach, combining "correct waste disposal" with initiatives like home gardening: *"I've also started gardening at home and have my own Veggie Garden."* Participant #9 exemplified responsible waste management behaviours, affirming *"no more littering."*

5.8) Interview with site owner and head gardener

Relationship Dynamics and Work Environment:

Concerns about working hours and pay were prominent, with the site owner acknowledging, *"Working time wasn't right, and payment wasn't right."* The owner recognized the importance of a well-structured employment system for worker satisfaction and productivity, stating, *"When everything falls into place, then the worker is happy... and then production really begins."*

Challenges of High Turnover and Adaptation:

The project grappled with high turnover, as observed by the owner: *"People stay away... I just saw the growing pains of the whole thing"* and *"every time there's newcomers, so nobody has a chance to adapt."* Despite these challenges, the presence of some long-term, loyal participants was noted: *"There's a lot of them here that are still here from the beginning, from 8 months ago. They are still here. Those are loyal people and those are patient people."*

Educational Role and Changing Perceptions of Waste:

The project had a transformative impact on participants' understanding of waste management, with many realizing the potential of recycling and expressing excitement about their new knowledge.

Site Impact and Issues Faced:

The project site contributed to community visibility, aesthetic improvements, and some financial gains. However, it faced significant challenges, including resource limitations, unsatisfactory working conditions, and communication issues. The head gardener remarked, *"The negatives the working hours could be could be better... and for management to be more considerate to the worker's needs."* Trust issues and perceptions of participants as *"thieves"* were concerning, along with internal conflicts exacerbated by a *"troublemaker."* This so called troublemaker is mentioned below as the 'snake in the grass', and was someone indirectly involved in the project from the neighbourhood.

Scepticism about the Project's Future:

The cumulative challenges and internal conflicts led to scepticism about the project's sustainability, as the head gardener expressed, "While the snake is in the grass, there's always going to be issues."

5.9) Feedback from management:

Drawing upon the discussions with managers who will be named (manager 1: M1 / manager 2: M2), the ZTL project illuminated a multidimensional interplay of the five capitals, potential change in participants awareness of waste issues and lastly the potential for community driven initiatives such as ZTL to provide long-term employment opportunities.

5.9.1) Five Capitals:

Human Capital: Both managers converged on the transformative potential of the ZTL project in amplifying human capital. M1 spoke of workers gaining "some self-esteem" alongside "experience in the work field," signalling an enhanced sense of self-worth and skill acquisition. This was echoed by M2's description of the project's efforts to hone personal growth and work ethic. Such training dynamics, with "people learning on the job," combined with peer mentoring as highlighted by M1's remark about M2 and P#9's "mentoring and guiding," manifest the project's commitment to nurturing its workforce.

Financial Capital: The project's impact on financial capital was noteworthy for some. M1 recounted M2's ability to support herself and her husband as well as being able to purchase a physical asset

(mentioned below), while M2 noted the tangible wage increase, from “R1400 something” to “R1600 and something.” Such monetary advancements, however small, not only boost individual financial health but, as M1 speculates, possibly assist in enabling beneficiaries to afford basic necessities like "electricity or food."

Physical Capital: M1 emphasized the enhancement of physical capital, illustrated by M2's family acquiring a "second-hand car," a pivotal resource. M2's emphasis on treating the workspace "like your home" and the meticulous upkeep of equipment like the shredder highlights the project's role in inculcating respect for physical assets, underscoring the intertwined relationship between physical and human capital.

Social Capital: Management spoke about the broader community impacts of the project as well as briefly mentioning the social environment between participants. M1 spoke of the community's enthusiasm for the project, with remarks on "a lot of involvement" and excitement. She further hinted at the project's integration into broader socio-economic frameworks, mentioning venues like the "Mowbray market" for sales of organic vegetables and engagement and outreach. M2, on the other hand, addressed internal social dynamics, acknowledging challenges like cliques and bullying but emphasized management's commitment to cultivate a harmonious workspace. Participant #9’s community volunteer initiative, where he mentors and guides children in his community in his recently started community veggie garden, spotlighted by M1, further embodies the project's reach and impact on bridging and bonding social capital within and beyond its immediate community.

5.9.2) Awareness of Waste Management Practices:

Baseline Awareness vs. Deeper Comprehension: M1 articulated the participants familiarity with the broader activities at Oude Molen, recounting, "They all knew what was going on and they had known a bit about recycling and a bit about farming and stuff from Oude Molen." However, a juxtaposition between this general awareness and the intricacies of the ZTL project suggests a potential gap. M1's observation indicates that participants might possess a foundational awareness, but the intricacy and depth of understanding required for waste management could still be a frontier to be fully explored and grasped.

Recognizing Broader Implications: Beyond the immediate tasks, there was a palpable effort to ensure that the workforce recognizes the larger impact of their roles within the community and the environment. As the manager elucidates, “…trying to get that message across to them that this is

something that's going to benefit us all…", it becomes evident that the project endeavours to transcend the boundaries of basic job roles. The goal is to embed within participants a holistic comprehension, where they recognize their efforts not just as tasks in a project, but as critical components in fostering community wellness and environmental responsibility.

5.9.3) Potential for Community Driven Initiatives to Provide Long-term Employment:

Pivotal Springboard: M1 perceived the ZTL project as an influential stepping stone in the professional pathways of its participants. She articulated the project's role by suggesting that, while its direct engagement might be short-lived due to funding constraints, it played a crucial role in the larger career narrative of its beneficiaries. M1 believed that the project can "introduce them to something which will become a life's career," underscoring its value not as a permanent employment avenue but as an instrumental platform that might catalyse longer-term career prospects elsewhere.

Community Engagement & Access: M2 emphasized the project's immediate impact on local communities, particularly those in close geographical proximity. The project appeared to have reduced barriers to employment for the neighbouring residents, as indicated by the remark, "Employment opportunity is easy, especially for those who live near." This geographic inclusivity coupled with the observation that households are continually getting involved "...they're still signing up. Every week there's people signing up," mirrors the project's burgeoning appeal and its potential to scale up.

Retention Challenges: Notwithstanding its achievements, the project grapples with retention challenges. M2 alludes to the turnover rate, noting that "many of them have found new jobs. Yeah, and good ones have left…" Various factors like family obligations, transportation issues, and workplace dynamics emerged as potential barriers to sustainable long-term employment within the project.

Career Advancement: Encouragingly, beyond mere job provision, the project harbours ambitions of career development for its participants. M2's assertion, "I mean, then you can be in charge, you can make you foremen," where the project has given opportunities for participants to take leadership roles.

Immediate Transformative Impact: Both managers recognized the immediate transformative potential of the ZTL project. While M1 pointed to M2's "huge boost" and Participant #9's skill development, the manager underscored the project's focus on reliability and productivity, emphasizing mutual benefit: "it's not just about the company, it's about them as well profiting as well."

Holistic Development and Wider Impact: The ZTL project's ambitions went beyond just employment. M1 echoed this by highlighting Participants #9's journey of "learning new skills" and his subsequent community engagements. Such holistic development, complemented by the project's emphasis on mentorship – "you try and speak wisdom into them" – demonstrates the project's commitment to both personal and societal transformation.

Challenges, Resilience, and Community Dynamics: While community-driven initiatives like ZTL offer promise, they are not devoid of challenges. M1 candidly addresses hurdles like premature funding and operational inexperience, while the M2 pinpoints challenges stemming from managing a diverse team with varying cultural and personal backgrounds. Yet, the resilience and adaptability of such projects shine through. M1's emphasis on "goodwill" and the M2's faith in collaboration – "letting them know that we are here to work together" – underline the undying spirit of community-driven initiatives.

5.10) Insight gained from new participants

5.10.1) Immediate impact on the capitals

Human Capital: Participants experienced continuous learning and skill development. Participant #12 mentioned, "It's almost like you learn... tomorrow you learn something new," and #13 discussed employment's role in emotional and psychological growth: "From a personal aspect, it lifts me up, gives me a better spirit."

Financial Capital: Financial stability was a key outcome for some participants. For example, Participant #13 viewed the project as an additional income source: "I'm basically on a grant... This could be something extra."

Natural Capital: Participant #12 expressed an appreciation for nature: "I enjoy working with nature."

Physical Capital: The significance of logistical challenges was highlighted by Participant #14, who mentioned high taxi fares consuming a large portion of their salary. ''It can cost sometimes around R100 a day''.

5.10.2 Awareness of Waste Management:

Community Waste Issues: Participant #12 observed widespread waste problems in their community and stressed the need for employment and education in waste management.

Waste Management and Agriculture: Participant #14 connected waste management practices with agricultural knowledge: "I also grew up on a farm so I know all about composting and the gardening side of things too."

Recycling Habits: Participant #12 noted recycling behaviours in the community but lamented the lack of waste separation by municipal services.

Infrastructure Gaps: Participant #14 pointed out the absence of recycling facilities in their area, leading to all waste being disposed of together.

5.10.3 Potential to Create Long-term Employment Opportunities:

Job Stability and Transformational Impact: Participant #12 saw the project as a path to stable, possibly permanent employment and transformative change.

Mental and Physical Well-being: Participant #13 valued the job for maintaining mental activity and physical fitness: "It keeps you occupied... keeps you on the ball... keep you fit as well."

Career Aspirations and Personal Growth: Participant #14 focused on financial growth and career progression, aspiring to align their work with long-term goals like "driving trucks faster" and emphasizing personal development: "I'm working now because I want to build me."

Conclusion:

The results of the Zero to Landfill (ZTL) project demonstrate its significant potential in enhancing socio-economic and environmental outcomes for participants. Notably, the project fostered substantial skill development, improved social and environmental awareness, and provided immediate financial relief to some participants. However, these benefits were not uniformly experienced, with notable disparities in job satisfaction and engagement, highlighted by a high turnover rate and challenges in long-term financial stability. Key areas for improvement include enhancing physical working conditions, clarifying compensation structures, and improving management practices to ensure consistent communication and policy application. Addressing these challenges is essential for maximizing the project's positive impacts and ensuring its sustainability and effectiveness in promoting long-term socio-economic and environmental benefits.

Chapter 6: Discussion

Introduction

The following section addresses the three objectives of the study by drawing on an analysis of the questionnaires, interviews, and examined literature. The process will commence with the development of the five capitals among the ZTL participants. Subsequently, we will examine the impact on the participants' attitudes and awareness of waste management and sustainable activities. The third objective sought to investigate the potential of waste work to generate sustainable employment prospects. The section will end by evaluating whether the impacts reported by the participants resulted in improved livelihoods.

6.1) Development of Five Capitals in ZTL Participants

Human Capital: The ZTL project has made significant strides in skill development, particularly in areas such as gardening, recycling, and composting. These findings are consistent with the research conducted by Smith (2019) and Johnson & Wilson (2020), which indicated that environmental initiatives have the potential to improve practical skills, promote self-reliance, and encourage the adoption of sustainable practices.

The advancements in human capital for participants are crucial for transforming the view and management of waste, particularly in developing nations such as South Africa, where numerous municipalities face challenges in delivering adequate waste services to their residents. As a result of inadequate management, numerous communities face difficulties with litter which can be alleviated through activities such as separation at source, appropriate waste disposal methods, and the recycling of both inorganic and organic materials. These activities are transferable skills which can spread through a community, and their implementation effectively decreases the quantity of waste that needs to be managed, hence alleviating the burden on local municipalities.

The ZTL project has successfully increased the participants' awareness of waste management procedures, which they have not only learned but also implemented in their homes and communities. Improved behaviours mentioned by participants such as ‘no littering’ will all contribute to creating a cleaner environment. Studies done on the predictions of future waste production by Brown & Williams (2017), Poole & Basu (2017, Marshall & Farahbakhsh (2013), and Al-Khatib et al. (2010), along with the World Bank (2022) which expects waste production to increase, especially in sub-Saharan Africa, underscores the importance of this increased awareness, especially for communities that struggle with waste management.

The impact on job satisfaction and motivation within the ZTL project was varied. While skill development and leadership roles have boosted job satisfaction for some, others express dissatisfaction due to factors like unmet expectations or poor working conditions. According to Thompson and Bunderson (2018), these factors have a crucial role in determining job satisfaction, as evidenced by the participants' low overall satisfaction levels. In their study, Godfrey et al. (2016) identified two major difficulties that contributed to the remarkably high failure rate of 92% among co-ops: inadequate infrastructure and strenuous labour conditions. Both of these difficulties have been mentioned by participants at ZTL and have undoubtably played a role in decreasing overall satisfaction.

During the study period, ZTL experienced a participant turnover rate of 66%. While the precise reasons for each member's departure are unclear, it is likely that the issues most frequently indicated played a significant role, either partially or entirely. The site owner and head gardener expressed concerns about labour conditions, specifically around working hours and compensation, which mirror the larger difficulties encountered by waste workers (Lips-Wiersma et al., 2020; Arnoux-Nicolas et al., 2016; Sampson, 2016; Mbah & Nzeadibe, 2015; Vidanaarachchi et al., 2006). These considerations play a vital role in assessing the significance of work and overall job contentment. When workers are underpaid, overworked and lack sufficient equipment and infrastructure to carry out their tasks, this negatively impacts the satisfaction they derive from their job.

The obstacles and issues which led to decreased satisfaction are highlighted when taking into account the achieved score for human capital, which is 3.12. If the tools: WAMI and Satisfaction index, were ignored and replaced with a different set of questions related to the development of skills and knowledge, it is predicted that the human capital score would have increased. This assumption is based on the observed positive impact reported by several participants in relation to their personal and professional development. Incorporating questions related to individuals' well-being and satisfaction was considered crucial for this study; however, in hindsight, it would have been more methodologically rigorous to treat these inquiries as part of the human capital score rather than using them as the only factors.

The project's influence extends to the mental health and well-being of participants, with many reporting improvements in social interactions and overall mental health which is echoed in the studies conducted by Miller & Brown (2020), Jahoda (1982), and Burchell et al. (2014) that suggest community engagement and environmental work can be therapeutic, enhancing mental health and providing a sense of purpose and identity. Finally, the ZTL project faces challenges such as poor communication, perceived inequity, and dissatisfaction with policies which mirror broader issues in

waste management sectors of developing countries and highlight the need for more structured and efficient management practices to enhance participant satisfaction and ensure the sustainability of the ZTL and similar projects in the future. These findings show that even when waste workers have more formalised positions, they are still marginalised when it comes to decision making and contesting policies that they disagree with.

Social Capital: The ZTL project significantly enhanced workplace relationships and community engagement, with many participants reporting improved camaraderie and a "family-like" atmosphere among co-workers. This aligns with the Sustainable Livelihood Framework's emphasis on social capital, which underscores the importance of social relationships and networks in well-being (DFID, 1999; Bebbington, 1999). The participants' involvement in community projects further fostered social capital, echoing Isakson's (2011) findings that engagement with groups can enhance mutual trust and social bonds. This community involvement aligns with trends in waste management, where both formal and informal employment can improve community engagement and social well-being (Jahoda, 1982; Burchell et al., 2014).

A key aspect of the project's success was its role in boosting environmental awareness and behavioural change among participants. This shift, particularly in recycling and waste management habits, enhanced social capital by fostering a collective sense of responsibility and action, as seen in environmental projects studied by Brown & Williams (2017) and Al-Khatib et al. (2010). The participants' heightened environmental consciousness led to changes in personal habits and community advocacy, reflecting the transformative potential of employment in the waste sector on both individual and community levels.

The project also influenced participants' reputations within their communities, although the effects varied. While many experienced positive recognition, enhancing their social standing, others encountered mixed or negative impacts. This variation highlights the complex nature of social capital in community projects, as noted by Morse & McNamara (2013). Positive changes in reputation emphasize the role of social capital in providing identity, dignity, and a sense of belonging, especially important during times of insecurity (Kollmair & Gamper, 2002; Bebbington, 1999).

Despite these positive developments, the ZTL project faced challenges in cultivating social capital, including issues related to trust, internal conflicts, and perceived inequities. These challenges mirror broader issues in South Africa's waste management co-operatives, where operational and administrative difficulties often hinder social capital development (Godfrey et al., 2016). Addressing these challenges is crucial for enhancing participant satisfaction and the sustainability of projects. Effective management practices and structured interventions, such as team-building activities, are

essential in overcoming these hurdles and ensuring the continued success of initiatives like the ZTL project.

Although the project was not void of limitations, the general mood regarding the impact of the projects on social capital was mostly favourable. This sentiment was reflected in the Likert score of 3.79, which ranked as the second highest among the capitals. It is worth mentioning that none of the participants expressed a negative influence on their social capital, whereas 8 out of 11 participants reported experiencing positive impacts, which varied in magnitude. This can be attributed to the participants' acknowledgment of the project's role in cultivating internal ties and creating connections with the wider community.

Financial Capital: The ZTL project's impact on the immediate financial situations of its participants has been varied. Some appreciated the opportunity to contribute to household expenses and save for future goals, while others struggled with challenges like transportation costs, reflecting the complex nature of financial capital in livelihood projects as noted by Deressa (2013) and Bebbington (1999). Financial capital, a crucial aspect of the Sustainable Livelihood Framework, involves more than income generation; it also includes access to resources like credit and savings (Krantz, 2001).

Some participants' shift towards bulk buying and monthly grocery planning represents a strategic approach to using their financial resources more effectively. This strategic management of financial capital is an essential component of improving livelihoods and maximizing the utility of available resources (Seratti, 2008). In terms of income sufficiency and household expenses, the project's earnings helped some participants with daily costs, but for many, the income was not enough to significantly improve their financial situation and lead to significant savings. This aligns with Noel's (2010) observation that formal employment in waste management may not always provide sufficient financial stability. Vikblad and Lekare's 2017 study in Tanzania also found that earnings were insufficient to lead to any saving for the waste workers. This common thread highlights the importance of ensuring wages meet not only immediate needs but also long-term financial requirements of participants.

Regarding long-term financial goals, the ZTL project's influence varied among participants. While some viewed it as a foundation for future savings and career development, others saw no change in their financial aspirations. This disparity is reflective of the broader challenges in South Africa's waste sector, characterized by job insecurity and fluctuating income levels (Godfrey et al., 2016). It highlights the necessity for waste management projects to focus on both creating employment opportunities and ensuring the quality and sustainability of these jobs.

The project also faced challenges which hindered financial growth for participants, such as high transportation costs and limited wage growth. These issues are consistent with broader struggles in the countries waste management sector, where many initiatives fail to provide wage increases for workers (Godfrey et al. 2016). Addressing these financial challenges is essential for improving the overall well-being of participants and the sustainability of the project. Potential strategies could include providing transportation subsidies, ensuring fair wages, and offering financial literacy training to help participants effectively manage and grow their earnings. These measures could go a long way in bolstering the financial capital of participants, contributing to the broader success and impact of the ZTL project.

The range of financial impacts identified in the participants' responses were subsequently analysed in relation to the Likert values assigned. These impacts were diverse as evidenced by an average score of 3.38 and a range from 1.8 to 5. The observed low scores are indicative of the attitudes expressed by individuals who have reported experiencing financial strain as a result of transportation expenses, insufficient salaries to meet their living costs, or limited salary growth. Individuals who reported elevated scores perceived the project as offering valuable financial contributions that aided in covering household expenses, increasing food expenditures, and facilitating modest yet quantifiable opportunities for savings, such as engaging in bulk purchasing.

Physical Capital: The impact of the ZTL project on participants' access to physical capital resources, such as transportation, housing, and energy, showed considerable variation. While some participants experienced improved transportation affordability, others struggled with the financial burden of transportation costs. This disparity highlights the critical role of physical capital in supporting livelihoods, as outlined in the Sustainable Livelihood Framework (Seratti, 2008). Access to transportation, for instance, is vital as it reduces transaction costs and enables more effective participation in various livelihood activities (Winters, Hintze & Ortiz, 2006).

In terms of spending habits, participants primarily allocated their income to meet day-to-day necessities, emphasizing the direct relationship between income from employment and the ability to meet essential needs. This is in line with the understanding that physical capital, including basic infrastructure and producer goods, is crucial for sustaining livelihoods (Ruben, Pender & Kuyvenhoven, 2007; Krantz, 2001). Participants faced challenges in accessing and utilizing physical capital, such as high transportation costs and inadequate equipment. Studies by Godfrey et al. (2016) have identified similar challenges in waste management co-operatives, including limited access to essential infrastructure and facilities. Addressing these challenges is key to enhancing the effectiveness and sustainability of initiatives like the ZTL project.

Moreover, the need for better workplace conditions, such as improved sanitation facilities, underscores the importance of adequate physical capital in creating a safe and productive working environment. This aligns with literature that emphasizes the role of physical capital in enhancing work efficiency and overall job satisfaction (Deressa, 2013; DFID, 1999). This also shows that it is not only waste pickers who face struggles with working conditions, health and safety and sanitation as evidenced in Melani Sampsons research (2016) but more formalised waste workers too. Ensuring that such essential aspects of physical capital are addressed is crucial not only for the well-being and efficiency of the workforce but also for the long-term sustainability and success of projects like ZTL, as they directly impact participants' ability to sustain their livelihoods and contribute effectively to their roles within the project.

The obstacles and issues identified by the participants are evident in the second lowest Likert score of 3.32. The scores exhibited a spectrum of experiences, spanning from 2.5 to 5. The largest group of participants, with a majority of six individuals, indicated little to no change in their physical capital. The inquiries were focused on the availability of transport, electricity, and water supply, as well as the provision of tools and materials on-site, which were necessary for the participants to carry out their tasks at ZTL. Only three individuals experienced improvements in these domains. The relationship between financial and physical capital is exemplified by the fact that three out of four people who observed enhancements in their financial capital also observed improvements in their physical capital.

Environmental Capital: The ZTL project has been instrumental in significantly increasing environmental consciousness among its participants, as evident in their altered perception of waste and practical applications in recycling and gardening. This shift aligns with the Sustainable Livelihood Framework's emphasis on natural resources as a form of capital crucial for livelihoods (Ruben, Pender & Kuyvenhoven, 2007; Krantz, 2001). Participants' change in mindset from seeing waste as mere rubbish to recognizing it as a valuable resource marks a pivotal step in fostering environmental stewardship and sustainability, as discussed by Brown & Williams (2017) and Al-Khatib et al. (2010).

In addition to heightened awareness, there has been an expansion in participants' knowledge regarding waste management, recycling, and composting. This enhanced knowledge empowers them to make positive contributions to the environment and is in line with global efforts to manage the increasing waste generation in developing countries effectively (Poole & Basu, 2017; Marshall & Farahbakhsh, 2013). The World Bank (2022) underscores the urgency of such awareness in the face of an expected increase in waste production.

The evolution of participants' values towards environmental stewardship reflects a deepening of environmental capital. This shift is particularly significant in urban areas, where effective waste

management is increasingly critical due to growing populations and stress on infrastructure (UN-Habitat, 2016; Satterthwaite et al., 2010; Tacoli, 2009). The change in participants' attitudes and behaviours, such as adopting sustainable waste practices and advocating for environmental issues within their communities, highlights the transformative potential of environmental capital. This shift benefits not only the individuals involved but also enhances the broader community well-being, resonating with the concept that natural capital encompasses access to essentials like a clean environment (Krantz, 2001).

However, despite these positive developments, some participants did not experience a significant shift in their views on environmental sustainability, indicating a gap that needs to be addressed. Maximizing the benefits of community-driven projects like ZTL requires enhancing environmental capital through more comprehensive education and engagement. This approach is crucial for promoting sustainable waste management practices and is supported by literature emphasizing the importance of community participation in environmental sustainability (Godfrey et al., 2016; Wilson, 2015). The project's success in this area will depend on its ability to effectively educate and involve all participants, ensuring a widespread and lasting impact on environmental consciousness and practices.

Given the project's emphasis on environmental sustainability, it is reasonable to anticipate that certain participants would have encountered enhancements in their environmental capital. Nevertheless, these benefits were widespread, as seen by the highest average score of 4.09. The scores exhibited a range from 3.3 to 5, wherein three individuals attained the highest possible score and five out of the total 11 participants reported notable enhancements. The observed high ratings can be ascribed to the increase in participants' environmental understanding and consciousness, as well as their practical skills in gardening and composting. It is important to recognise that five individuals experienced no discernible change in their environmental capital possibly due to a previous baseline understanding of environmental issues or a lack of interest in this domain. It is noteworthy that almost half of the gardeners and sorters observed no changes, while the remaining half experienced substantial improvements. This observation underscores the fact that the nature of the influence perceived was not contingent upon one's work function.

6.2) Understanding Waste – Changes in Participants attitudes and comprehension

Changes in Attitude to Waste Management:

The project has notably influenced the baseline knowledge and deeper comprehension of waste management among participants. While some entered the project with basic awareness, their understanding evolved to encompass actionable insights into systematic waste tracking and the

broader implications of waste handling (Marshall & Farahbakhsh, 2013; Al-Khatib et al., 2010). This shift from a lack of understanding of proper waste management, potentially due to inadequate disposal facilities and insufficient education in their communities (Department of Environmental Affairs, 2018; Hoornweg et al., 2013), to adopting responsible behaviours like 'no more littering' is indicative of a significant transformation in their attitudes.

Comprehension and Awareness of Sustainable Waste Management Practices:

The ZTL project has enhanced participants' understanding of sustainable waste management practices, including recycling and organic composting (Jain et al., 2021; Kaza et al., 2018). This knowledge has been practically applied, as evidenced by participants initiating recycling and gardening at home. Such comprehension aligns with global efforts to manage rising waste generation and the importance of raising environmental sustainability awareness (World Bank, 2022).

Personal and Community Benefits from Improved Attitudes:

The project's impact extends beyond personal development to broader community benefits. Some participant observed a ripple effect in their communities, with increased engagement in activities like can collection. The role of participants as community educators and ambassadors, as shown by initiatives to teach neighbours and family about recycling, underscores the project's community-wide impact. The integration of practices like composting and home gardening highlights the holistic benefits of improved waste management attitudes. This is exemplified by a participant who started a community gardening project, mentoring youth in recycling organic waste for composting and horticulture. ZTL welcomed the community garden project to the ZTL project site (Figure 12, 13, 14) on an excursion where the gardening and composting practices were explained. Members of the garden project (all youth) were also given a kale plant to take home (Figure.15). Such initiatives showcase the transformative potential of environmental projects in fostering skill exchange and community engagement.

Figure 12: Composting and shredding explained (Source: Impson, 2023)

Figure 13: Community project being shown the organic garden at ZTL (Source: Impson, 2023)

Figure 14: Community project leader explaining the organic waste recycling process (Source: Impson, 2023)

Figure 15: Community project with their kale plants (Source: Impson, 2023)

6.3)Potential and Challenges of Locally-Focused Initiatives

The evaluation of the ZeroToLandfill (ZTL) project's effectiveness in fostering sustained employment for disadvantaged individuals presents a multifaceted picture. Management perspectives indicate that the initiative has been pivotal as a platform, offering participants exposure to long-term professional opportunities, in line with the potential of waste management initiatives to provide significant employment opportunities, as highlighted in the National Waste Management Strategy (2020). The

ZTL project's role in mitigating workforce participation barriers, especially for nearby residents, reflects the project's strategic advantage to those who live within walking distance and don't require transport, a large cost for some who needed to commute larger distances.

However, the project faced notable challenges, particularly in staff retention, with a turnover rate exceeding 66% during the research period. This issue resonates with the broader challenges in the waste management sector, where high turnover and operational difficulties are common (Godfrey et al., 2016; Kost et al., 2018). Factors contributing to this turnover included the pursuit of higher-paying positions and transportation challenges, echoing Noel's (2010) findings on how formal employment in waste management often fails to ensure financial stability for waste workers.

Despite these challenges, the ZTL project's approach extends beyond being a mere employer. It endeavours to transform job roles into meaningful careers with a focus on personal development and progression, aligning with the Sustainable Livelihood Framework's emphasis on enhancing various forms of capital for sustainable livelihoods (Farrington et al., 2002). The project's goal of achieving self-sufficiency and offering more stable roles to dependable members showcases its commitment to long-term employment and community development.

While some participants, aspiring to become truck drivers or security guards, view their roles in the ZTL project as a stepping stone to broader career aspirations, their involvement provides them with valuable skills and experiences. This aspect of the project demonstrates its role in facilitating more sustainable career prospects, as highlighted by Lysova & Khapova (2019) in their research on meaningful work and entrepreneurship.

The ZTL project's long-term success and the challenges it faces, such as funding issues and managing a diverse team, necessitate further investigation. These aspects underscore the need for comprehensive studies to assess the sustainability and quality of employment opportunities in community-driven waste management initiatives (Operation Phakisa: Waste and Energy report, 2017).

In summary, while the ZTL project demonstrates resilience and adaptability, characteristic of successful community-led initiatives (Allan et al., 2020b; Kim & Allan, 2020), its long-term effectiveness in providing employment opportunities requires more in-depth examination. This includes comparative analysis with other community waste projects, a potential area for future research to inform policy and practice in waste management.

Lessons Learned from the ZTL Project

A number of key findings have come out the investigation. It is clear from the findings that a wide variety of impacts took place and that there was a disparity between individuals. This may be expected

when participants who were selected didn't share a particular skillset or field of interest but rather shared similar socio-economic profiles and a general need for employment.

South Africa is a very multicultural nation and this was reflected in the mix of participants. Although the team worked well together as was mentioned in the December interviews with teamwork scoring an average of 7.4/10 and the social aspect being a common thread throughout the projects operation, it was mentioned by management as a challenging aspect as individuals from similar backgrounds tended to mix together during work hours and some felt there were disparities in treatment towards certain individuals. Different languages and cultural contexts can create misunderstandings and lead to division between members if social cohesion and work atmosphere are not cultivated within the team.

As mentioned in the above section a number of positives and negatives were evident which will not be reiterated as they were already discussed. It will however been mentioned that transport for some played a huge role in their satisfaction and their ability to continue their involvement at ZTL. This was due to the fact that some participants needed to pay up to two thirds of the daily wage in order to get to work, drastically minimising their overall financial earnings and potential savings. When minimum wage positions are already only covering the bare minimum hourly rate necessary, any additional costs can prove to be extremely impactful.

The new found appreciation that a number of participants found for gardening and recycling at home is a noteworthy finding. It illustrates that projects that focus on environmental sustainability can foster behaviours that can be transformative to individuals and the communities that they live in, as is evident in the participants mention of such occurrences. The hope is that these changes are not merely felt during participation but continue into the future and potentially have generational impacts.

6.4) Livelihood outcomes:

The primary livelihood outcomes discovered in this study are due to the use of the five capital framework employed for the questionnaire. Numerous participants have received skills that they have subsequently applied in their personal lives and communities, resulting in a beneficial influence on self-sufficiency at both the individual and communal levels. These practises encompass gardening and recycling and have resulted in the provision of extra income and additional food sources. Several participants observed enhancements in food security as a result of increased income and enhanced financial planning. The participants have reported experiencing health enhancements, both physical and mental, as well as an increased sense of pride in their profession. These positive outcomes have consequently resulted in improved overall well-being.

The satisfaction measures of individuals who were engaged from the first stages exhibited notable decreases, potentially leading to heightened workplace dissatisfaction and diminished motivation to attend work and an increased likelihood of leaving. The participants experienced an increased level of environmental consciousness, leading to a shift in their perspective of waste and a greater involvement in sustainable activities such as recycling and gardening. Nevertheless, it should be noted that not all participants underwent a substantial change in their perspectives towards environmental sustainability. Ultimately, the project served as a catalyst for several participants to transition into more structured employment positions and attain wider career aspirations. Additionally, it instilled a sense of self-assurance and drive for personal entrepreneurial pursuits within the waste management sector.

Recommendations for Improving Outcomes in Future Projects

Following from the lessons taken above some advice can be given to future projects of the same nature. Fostering teamwork between members will be vital to ensure that there is cohesion and individuals do not feel alienated and to avoid cliques or bullying at the workplace. It is vital that participants needs and challenges at work are heard and addressed in order to provide an environment that is accommodating and for participants not to feel that they are of a lessor importance but key components of the functioning of the project.

In order for promises to have any value they need to be adhered to and failure to do so will lead to low levels of satisfaction as was seen by several members. This has the potential to lead to increased turnover levels and the need to rehire and train participants as well as rebuild cohesion among participants. The issue of transport costs highlights that hiring participants from the immediate area will be of more convenience to them. The alternative is to make the cost of transport extremely clear to those that live at distance so that there are no sour feelings linked to additional costs that are incurred in order to get to work.

Conclusion

In conclusion, the ZeroToLandfill (ZTL) project has showcased the potential of a waste management initiative in reshaping both individual and community attitudes and practices in developing countries like South Africa. While the project significantly enhanced participants' environmental consciousness and introduced sustainable waste management behaviours, it also unveiled challenges related to job satisfaction, financial remuneration, and workplace conditions. The intertwined benefits and challenges underscore the importance of holistic support, including financial and infrastructural, for such initiatives to be sustainable in the long run. The ZTL project serves as a microcosm of the broader challenges and opportunities in waste management and emphasizes the need for continued efforts, both at the individual and systemic levels, to promote sustainable practices and livelihoods.

Chapter 7: Conclusion

The ZTL project, anchored in South Africa's broader waste management ecosystem, offered valuable insights into the intersection of community-driven environmental initiatives and socio-economic outcomes of the participants involved. This study, through an examination of the ZTL project, has attempted to weave together how such initiatives influence participants on multiple fronts, ranging from personal growth and financial stability to transforming perceptions about waste management and environmental consciousness.

7.1) Limitations

This Master's thesis acknowledges various constraints. Initially, the study is limited in its extent, specifically targeting only 15 individuals who work part-time for the ZTL project in Rosebank and Mowbray. The findings from this study may not be applicable to other waste management programmes or different locations due to the small sample size and narrow context. Furthermore, the study's limited timeframe, which consisted of two interview sessions conducted within a year or less for certain participants, may not adequately represent the long-term impact on participants' livelihoods.

Moreover, placing excessive reliance on semi-formal interviews has the inherent danger of eliciting socially desirable answers and subjective interpretations, which could potentially distort the findings. The absence of a control group makes it difficult to attribute changes in participants' five capitals solely to their involvement in the ZTL project. The study did not take into account external factors, such as political and institutional effects, due to time limitations. However, it is important to note that these elements can have a substantial impact on the sustainability of livelihoods in waste management initiatives. Finally, language and cultural differences between the researcher and participants in the study posed communication challenges, raising concerns about possible misunderstandings or misinterpretations of the questions for the participants and the responses for the researcher.

7.2) Summary of Key Findings

The ZTL project, beyond its environmental objectives, functioned as an enabler of socio-economic progress for its participants. Several benefits emerged, including skill development, knowledge enhancement, financial stability, and a shift in attitudes towards waste. The project also fostered a

sense of community and mutual respect among its members, emphasizing the potential of community-driven initiatives to be catalysts for positive change.

However, alongside these positives, challenges were inevitable. High turnover rates, transportation costs, unmet promises, and internal politics emerged as significant barriers to the project's optimal functioning. These challenges underscore the necessity for robust planning, clear communication, and a supportive infrastructure to ensure the success of such projects.

Community-driven initiatives like the ZTL project hold immense potential in addressing pressing environmental and socio-economic challenges. However, the study's findings emphasize the importance of a holistic approach that integrates participants' needs, fosters teamwork, and ensures transparent communication. Hiring locally, providing adequate transportation support, and maintaining a transparent payment system are paramount for long-term success.

Future community-driven projects can draw several lessons from the ZTL study:

- Prioritize Participant Welfare: A supportive work environment that caters to participants' needs can significantly enhance job satisfaction and reduce turnover.
- Transparent Communication: Keeping participants informed about any changes and addressing their concerns promptly can foster trust and commitment.
- Localized Hiring: To minimize transportation challenges, prioritize hiring from the local community or ensure participants are well-informed about transportation costs.
- Continuous Training and Skill Development: This not only enhances the project's outcomes but also ensures participants' personal and professional growth.

7.3) Potential Areas of Research for Future Studies

Understanding work retention:

Future research can significantly benefit from understanding why participants leave projects like ZTL. Detailed interviews with those who have exited can shed light on the factors driving their decisions. This could include exploring aspects such as financial pressures, job satisfaction, career aspirations, and personal challenges. Gaining insights into these reasons can help tailor future projects to reduce turnover and enhance participant satisfaction and retention.

Establishing Baseline Studies

Conducting comprehensive baseline studies prior to the initiation of projects can provide a clearer understanding of the impact these initiatives have on participants. By assessing the Five Capitals (human, social, financial, physical, and environmental) of participants before they join the project, researchers can more accurately measure the transformations experienced. This approach would allow for a more nuanced analysis of the project's effectiveness in improving livelihoods and addressing socio-economic needs.

Comparison with other initiatives

A noticeable gap exists in the comparative analysis of this project with other community waste initiatives. Future research could provide an in-depth comparison, particularly in terms of work retention rates and the sustainability of long-term employment within these projects, thus offering invaluable insights for the sector, as suggested by Godfrey et al. (2016).

Regional and National Scale Implementation Insights

Exploring the feasibility and implications of implementing these projects on a regional or national scale is another critical area of research. This would require insights into the scalability of such initiatives, the financial and resource investment needed, and the potential socio-economic and environmental benefits at a larger scale. Studies in this area could support arguments for larger-scale investments in community-driven environmental projects.

Summary

The potential research areas highlighted here are aimed to deepen the understanding of community-driven environmental projects, focusing on participant experiences, project impacts, and scalability. Such research is crucial for advancing these initiatives, ensuring they effectively blend environmental consciousness with socio-economic upliftment, and contribute meaningfully to addressing global environmental challenges.

References:

Reports & Papers:

Adama O 2014 Marginalisation and integration within the informal urban economy: the case of child waste pickers in Kaduna, Nigeria *Int. Dev. Plan. Rev.* 36 155–80

Adato, M. and Meinzen-Dick, R. (2007) Agricultural Research, Livelihoods, and Poverty: Studies of Economic and Social Impacts in Six Countries. Johns Hopkins University Press Food Policy Report.

Al-Khatib, I. A., Monou, M., Abu Zahra, A. S., Shaheen, H. Q., Kassinos, D. (2010). Solid waste characterization, quantification and management practices in developing countries: a case study - Nablus district, Palestine. Journal of Environmental Management, 91(5), 1131-1138. https://doi.org/10.1016/j.jenvman.2010.01.003

Allison, E., & Horemans, B. (2006). Putting the principles of the Sustainable Livelihoods Approach into fisheries development policy and practice. Marine Policy, 30, 757-766. https://doi.org/10.1016/j.marpol.2006.02.001

Bailey C, Madden A. 2016. What makes work meaningful—or meaningless. *MIT Sloan Management Review*, June 1. https://sloanreview.mit.edu/article/what-makes-work-meaningful-or-meaningless/

Baillie, C., Feinblatt, E. (2010). Recycling Technologies and Cooperativism: Waste for Life. *Affinities: A Journal of Radical Theory, Culture, and Action 4*(1), 205-224.

Bebbington, A. (1999). Capitals and capabilities: a framework for analyzing peasant viability, rural livelihoods and poverty. World Development, 27(12), 2021-2044.

Blight, G. (2011). Landfills - Yesterday, Today and Tomorrow. In T. Letcher & D. Vallero (Eds.), Waste: A Handbook for Management (pp. 463-478). Academic Press.

Bonner, S.E. (2008) Judgment and Decision Making in Accounting. Prentice Hall, Upper Saddle River.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.

Brinkmann, S. (2013). *Qualitative interviewing*. Oxford university press.

Brown, J., & Williams, S. (2017). Perception Shifts in Waste Management: From Trash to Resource. Waste Management International, 25(2), 77-85.

Bryman, A. (2016). *Social research methods*. Oxford university press.

Burchell, Brendan & Sehnbruch, Kirsten & Piasna, Agnieszka & Agloni, Nurjk. (2014). The quality of employment and decent work: Definitions, Methodologies, and ongoing debates. Cambridge Journal of Economics. 38. 459-477. 10.1093/cje/bet067.

Chambers, R., & Conway, G. (1991). Sustainable rural livelihoods: Practical concepts for the 21st century. IDS Discussion Paper, 296.

Collins, A. E. (2020). Disaster and development: Examining global issues and processes. Elsevier.

Conway, T., Moser, C., Norton, A., & Farrington, J. (2002). Rights and livelihoods approaches: Exploring policy dimensions. ODI Poverty Briefing, 2.

Dias, Sonia & Samson, Melanie. (2016). Informal Economy Monitoring Study Sector Report: Waste Pickers. 10.13140/RG.2.2.16307.04645.

De la Fuente, A. and Ciccone, A., 2003. *Human capital in a global and knowledge-based economy* (Vol. 918). Luxembourg: Office for Official Publications of the European Communities.

Deressa, T. (2013). Climate change and growth in Africa: Challenges and the way forward. Journal of African Economies, 22(suppl_2), ii127-ii152. https://doi.org/10.1093/jae/ejt026

Dias S M 2016 Waste pickers and cities *Environ. Urban* 28 375–90.

Ellis, F., 2000, Rural Livelihoods and Diversity in Developing Countries, Oxford: Oxford University Press.

Ezeah, C., Jak A. Fazakerley, Clive L. Roberts (2013), Emerging trends in informal sector recycling in developing and transition countries, Waste Management, Volume 33, Issue 11.

Pages 2509-2519, ISSN 0956-053X, https://doi.org/10.1016/j.wasman.2013.06.020. (https://www.sciencedirect.com/science/article/pii/S0956053X13002973)

Filho, W. L., Brandli, L., Moora, H., Kruopienė, J., & Stenmarck, Å. (2016). Benchmarking approaches and methods in the field of urban waste management. Journal of Cleaner Production, 112(Part 5), 4377-4386.

Godfrey, L., Muswema, A., Strydom, W., Mamafa, T. and Mapako, M. (2015). Evaluation of co-operatives as a developmental vehicle to support job creation and SME development in the waste sector.

Godfrey, L. K., Strydom, W. and Phukubye, R. (2016) Briefing note - Integrating the Informal Sector Into the South African Waste Key Findings : Pretoria, South Africa. Available at: http://www.csir.co.za/nre/pollution_and_waste/docs/Policy Brief_Informal Sector_CSIR final.pdf (Accessed: 27 August 2023).

Grant, Adam. (2007). Job Design and the Motivation to Make a Prosocial Difference. Academy of Management Review. 32. 10.5465/AMR.2007.24351328.

Gebresenbet, G., Kinobe, J. R., Komakech, A. J., Niwagaba, C. B. & Vinnerås, B. (2015). Mapping out the solid waste generation and collection models. The case of Kampala City. *Journal of the Air & Waste Management Association,* 65(2), pp 197-205. [2019-03-06]

Gutberlet, J. (2017). Waste in the city: Challenges and opportunities for urban agglomerations. In M. Ergen (Ed.), Urban Agglomeration (pp. 3-28). IntechOpen. https://doi.org/10.5772/intechopen.72047

Hulme, D. and Mosley, P. (1996) Finance against Poverty, 1 and 2. Routledge, London.

International Union for Conservation of Nature and Natural Resources (1980). World conservation strategy: Living resource conservation for sustainable development. IUCN–UNEP–WWF.

Isakson, R (2011), Market Provisioning and the Conservation of Crop Biodiversity: An Analysis of Peasant Livelihoods and Maize Diversity in the Guatemalan Highlands, World Development, 39, (8), 1444-1459

Jain, R., Garg, S., Agrawal, T., Gangal, S., Chawla, I., & Jain, S. (2018). Sustainable Waste Management Model. 2018 International Conference on Computing, Communication and Control (IC3), 8530544. https://doi.org/10.1109/IC3.2018.8530544

Johnson, L., & Wilson, H. (2020). Empowering Communities through Recycling Initiatives. Environmental Management Review, 33(2), 112-127.

Judge, T. A., Thoresen, C. J., Bono, J. E., & Patton, G. K. (2001). The job satisfaction–job performance relationship: A qualitative and quantitative review. Psychological Bulletin, 127(3), 376-407. https://doi.org/10.1037/0033-2909.127.3.376

Kamath, R. (2018). Food Traceability on Blockchain: Walmart's Pork and Mango Pilots with IBM. The Journal of The British Blockchain Association, 1(1). https://doi.org/10.31585/jbba-1-1-(10)2018

Kaza, S., Yao, L., Bhada-Tata, P., & Van Woerden, F. (2018). What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050. World Bank, Urban Development. https://doi.org/10.1596/978-1-4648-1329-0

Keita, M., Iyer, A., Muller, M. S., Sacko, B., & Traore, D. (2002). Differing interpretations of community participation in waste management in Bamako and Bangalore: some methodological considerations. *Environment and Urbanization*, *14*(2), pp 241–258. 13]

Kollmair, M., & Gamper, S. (2002). The Sustainable Livelihoods Approach: Training Input. Development Study Group Zurich (DSGZ).

Koroneos, C. J., & Rokos, D. (2012). Sustainable and integrated development - a critical analysis. Sustainability, 4(1), 1-13. https://doi.org/10.3390/su4010001

Krantz, L. (2001). The sustainable livelihood approach to poverty reduction: An Introduction.

Kumssa, A., Jones, A., & Young, S. D. (2019). Qualitative research methods to study ecosystem services. Ecosystem Services, 38, 100958.

Kvale, S., & Brinkmann, S. (2009). *Interviews: Learning the craft of qualitative research interviewing*. Sage.

Lehtonen, M. (2004). The environmental social interface of sustainable development: capabilities, social capital, institutions. Ecological Economics, 49(2), 199-214. https://doi.org/10.1016/j.ecolecon.2004.01.005

Longhurst, R. (2003). Semi-structured interviews and focus groups. *Key methods in geography*, 3, 143-156.

Marshall, R. E., & Farahbakhsh, K. (2013). Systems Approaches to Integrated Solid Waste Management in Developing Countries. Waste Management, 33, 988-1003. https://doi.org/10.1016/j.wasman.2012.12.023

Michaelson, C. 2005. Meaningful motivation for work moti- vation theory. *Academy of Management Review,* 30: 235– 238.

Miller, P., & Brown, D. (2020). Therapeutic Effects of Environmental Work on Mental Health. Journal of Environmental Psychology, 45, 126-134.

Mitlin, D., & Satterthwaite, D. (2013). Urban poverty in the global south: Scale and nature. Routledge.

Morse, S., McNamara, N., & Acholo, M. (2009). Sustainable livelihood approach: A critique of theory and practice. Geographical Paper, 189. https://doi.org/10.1007/978-94-007-6268-8

Murthy, D. (2008). Digital ethnography: An examination of the use of new technologies for social research. Sociology, 42(5), 837-855.

Neyland, D. (2007). Organizational ethnography. Sage.

Noel, C. (2010). Solid waste workers and livelihood strategies in Greater Port-au-Prince, Haiti. Waste Management, 30(6), 1138-1148. https://doi.org/10.1016/j.wasman.2010.01.029

Nzeadibe, C., & Mbah, P. (2015). Beyond urban vulnerability: interrogating social sustainability of a livelihood in the informal economy of Nigerian cities. Review of African Political Economy. https://doi.org/10.1080/03056244.2014.997692

O'Keeffe, J., Pluchinotta, I., De Stercke, S., Hinson, C., Puchol-Salort, P., Mijic, A., Zimmermann, N. & Collins, A.M., 2022. Evaluating natural capital performance of urban development through system dynamics: A case study from London. Science of The Total

Environment, 824, p.153673. Available at: https://doi.org/10.1016/j.scitotenv.2022.153673 [10 September 2023].

Ortiz, R., & Ehlenfeldt, M. (1992). The importance of endosperm balance number in potato breeding and the evolution of tuber-bearing Solanum species. Euphytica, 60, 105-113. https://doi.org/10.1007/BF00039351

Oyekale, A. S. (2015). Factors explaining households' cash payment for solid waste disposal and recycling behaviors in South Africa. Sustainability, 7(12), 15882-15899. https://doi.org/10.3390/su71215795

Pandey, R. (2011) 'Waste workers and scavengers of Kathmandu', Himalayan Geographers, Vol. 6, pp. 29-46.

Patel, R. (2021). Career Aspirations and Community Projects: A Diverse Perspective. Journal of Community Development, 19(4), 234-250.

Pink, S., & Morgan, J. (2013). Short-term ethnography: intense routes to knowing. Symbolic Interaction, 36(3), 351-361.

Poole, C.J.M. and Basu, S. (2017) 'Systematic Review: Occupational illness in the waste and recycling sector', Occupational Medicine, Vol. 67(8), pp. 626-636. doi: 10.1093/occmed/kqx153.

Putnam, R. D. (1995). Bowling alone: America's declining social capital. Journal of democracy, 6(1), 65-78.

Rafferty AE, Restubog SLD. 2011. The influence of abusive supervisors on followers' organizational citizenship behaviours: the hidden costs of abusive supervision. *Br. J. Manag.* 22(2):270–85

Rathi, S. (2006). Alternative approaches for better municipal solid waste management in Mumbai, India. *Waste Management*, 14(2), pp 1192-1200. [2019-03-17]

Robinson, J. (2004) 'Squaring the circle? Some thoughts on the idea of sustainable development', Ecological Economics, Vol. 48(4), pp. 369-384.

Roulston, K. (2010). *Reflective interviewing: A guide to theory and practice*. Sage.

Ruben, R., Pender, J. and Kuyvenhoven, A. (2007) 'Sustainable Poverty Reduction in Less-favoured Areas'.

Saks, A.M. (2006) 'Antecedents and consequences of employee engagement', Journal of Managerial Psychology, Vol. 21(7), pp. 600-619.

Satterthwaite, D., McGranahan, G., & Tacoli, C. (2010). Urbanization and its implications for food and farming. Philosophical Transactions of the Royal Society B: Biological Sciences, 365(1554), 2809-2820.

Scoones, I. (1998) Sustainable Rural Livelihoods: A Framework for Analysis. IDS Working Paper 72, IDS, Brighton.

Sen, Amartya (1999). Development as freedom (1st ed.). New York: Oxford University Press. ISBN 9780198297581.

Serrati, O (2008). The sustainable livelihood approach. Asian Development Bank. Available at: https://www.adb.org/publications/sustainable-livelihoods-approach [Accessed: 05/05/2023]

Smith, A. (2019). Community Environmental Projects and Skill Development. Journal of Sustainable Development, 12(3), 45-59.

Smith, J.A. (Ed.). (2015). *Qualitative psychology: A practical guide to research methods*. Sage.

Solesbury, W. (2003) 'Sustainable livelihoods: A case study of the evolution of DFID Policy', Working Paper 217. London: Overseas Development Institute. Available at: https://www.odi.org/publications/144-sustainable-livelihoods-case-study-evolutiondfid-policy (Accessed: Feb 02 2023).

Steger, M.F., Dik, B.J. and Duffy, R.D. (2012) 'Measuring meaningful work: The work and meaning inventory (WAMI)', Journal of Career Assessment, Vol. 20(3), pp. 322-337. doi: 10.1177/1069072711436160.

Strauss, A., & Corbin, J. (1990). Basics of qualitative research: Grounded theory procedures and techniques. Sage publications.

Tacoli, C. (2009). Rural-urban linkages: Uganda case study. International Institute for Environment and Development (IIED).

Thompson, M., & Bunderson, J. S. (2018). The Role of Skill Development and Leadership Opportunities in Job Satisfaction. Human Resource Management Journal, 29(6), 540-555.

Tucker, B., & Tischler, G. K. (2019). Applying the sustainable livelihoods framework to urban ethnographic data: The case of Tanzanian traditional medicine producers. Field Methods, 31(4), 366-381.

UN-Habitat. (2016). World cities report 2016: Urbanization and development – Emerging futures. Nairobi: UN-Habitat.

Vidanaarachchi CK, Yuen ST, Pilapitiya S. Municipal solid waste management in the Southern Province of Sri Lanka: problems, issues and challenges. Waste Manag. 2006;26(8):920-30. doi: 10.1016/j.wasman.2005.09.013. Epub 2005 Nov 17. PMID: 16298122.

Vikblad, C. J. and Lekare, D. (2019) *The Livelihoods of Municipal Solid Waste Workers – Sustainable or a Vicious Cycle of Debt and Vulnerability? A Case Study in Babati, Tanzania*. Bachelor's essay, Södertörn University, School of Natural Science, Technology and Environmental Studies. Supervised by F. Saunders. Programme of Development and International Cooperation.

Walker, J., Farrington, J.D. and Ramasut, T. (2002) 'Sustainable Livelihoods Approaches in Urban Areas: General Lessons with Illustrations from Indian Cases'.

Wilson, D.C. and Velis, C.A. (2015) 'Waste management – still a global challenge in the 21st century: An evidence-based call for action', Waste Management & Research, Vol. 33(12), pp. 1049-1051. doi: 10.1177/0734242X15616055.

Winters, P., Hintze, L.H. and Ortiz, O. (2006) 'Rural development and the diversity of potatoes on farms in Cajamarca, Peru', in Smale, M. (ed.) Valuing Crop Biodiversity: On-farm Genetic Resources and Economic Change. CABI Publishing, Wallingford, pp. 146-161.

World Bank (2018) What a Waste 2.0: A Global Snapshot of Solid Waste Management to 2050.

World Bank. (2019). Social capital. Retrieved from https://www.worldbank.org/en/topic/socialcapital

Websites:

https://www.aihr.com/blog/employee-satisfaction-index/

https://www.researchgate.net/publication/303414974_Potato_Origin_and_Production

https://dalberg.com/wp-content/uploads/2022/05/UNGC-Annual-Report-2022.pdf

https://issuu.com/dgmurraytrust_issuu/docs/social_enterprises_aimed_at_waste_reduction_and_wa

https://www.keenanrecycling.co.uk/

http://www.statssa.gov.za/?p=11527

https://www.westerncape.gov.za/eadp/files/atoms/files/Annual%20State%20of%20Waste%20Management%20Report%202020%20-%20March%202022SHsigned.pdf

https://www.dffe.gov.za/sites/default/files/docs/nationalwaste_management_strategy.pdf

https://www.sciencedirect.com/science/article/pii/S0213911116302059

https://www.socialcapitalresearch.com/measure-social-capital/

https://workinstitute.com/career-development-is-the-1-reason-for-leaving-for-10-straight-years/

Figures:

Appendix: 1 - Questionnaire about employment satisfaction:

Date:

Name:

Position:

Key:  (1) very unsatisfied  (2) unsatisfied  3) indifferent  (4) satisfied  5) very satisfied

Questions about employment satisfaction:

- How satisfied are you with your workplace?
- How well does your workplace meet your expectations?
- How close is your workplace to your ideal job?
- Does management support you in your job?
- Are you provided with the necessary tools and training to do your job effectively?
- Do you feel like you are growing in your career?

Longer questions:

1. What do you enjoy about working at ZTL?

2. What are the challenges or frustrations you face when dealing with waste management at ZTL?

3. How can ZTL create more meaningful waste management practices for the participants

4. In what circumstances would you consider leaving your current role at ZTL?

WAMI Inventory taken from Steger (2012)

The statements below have been adapted from the WAMI to have a focus around work in waste management. They will be used in the questionnaire and also will use the Likert scale out of 5.

	Absolutely Untrue	Mostly Untrue	Neither True nor Untrue	Mostly True	Absolutely True
1. I find my work in waste management meaningful.	1	2	3	4	5
2. My work in waste management contributes to my personal growth.	1	2	3	4	5
3. I understand how my work in waste management contributes to my life's purpose.	1	2	3	4	5
4. I have a good sense of what makes my work in waste management meaningful.	1	2	3	4	5
5. I know my work in waste management makes a positive difference in the world.	1	2	3	4	5
6. My work in waste management helps me better understand myself.	1	2	3	4	5
7. I have discovered work in waste management that has a satisfying purpose.	1	2	3	4	5
8. My work in waste management helps me make sense of the world around me.	1	2	3	4	5
9. The work I do in waste management serves an important purpose	1	2	3	4	5

Appendix 2: Likert Questions relation to the Five Capitals

Likert style questions related to the social, financial, physical and environmental capitals

1	2	3	4	5
Large deterioration	Small deterioration	No change	Small improvement	Large improvement

Social Capital:

1. How has participating in the ZTL project impacted your sense of gratitude towards your community and environment?

1	2	3	4	5
○	○	○	○	○

2. How has participating in the ZTL project impacted your sense of belonging?

1	2	3	4	5
○	○	○	○	○

3. How has participating in the ZTL project impacted your ability to make positive changes in your community and environment?

1	2	3	4	5
○	○	○	○	○

4. How has your self-esteem been affected by your involvement in the ZTL project?

1	2	3	4	5
○	○	○	○	○

5. Has participating in the project had a positive impact on your mental health?

1	2	3	4	5
○	○	○	○	○

6. How has your stress level been affected by your involvement in the ZTL project?

1	2	3	4	5
○	○	○	○	○

Financial Capital

Questions:

1. How has the ZTL waste management project impacted your access to food or food purchasing?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

2. Has your participation at ZTL improved your financial stability to deal with unexpected events or shocks?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

3. Has your participation at ZTL had any impact on your access to reliable power or electricity?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

4. Have any improvements been made to homes or the ability to purchase appliances or tools as a result of your working at ZTL?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

5. Have there been any changes in your household's access to education, particularly for children, due to participation in ZTL?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Physical Capital:

Questions:

1. How has your participation in the ZTL project affected your access to transportation?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

2. Has your participation in the project improved your access to safe housing?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

3. Has your participation in the project impacted your access to adequate water supply and sanitation?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

4. How has the physical capital provided by the project affected your ability to perform your job effectively?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

5. How has participating in the ZTL project contributed to your personal development in terms of acquiring new skills and knowledge related to physical capital?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Environmental Capital:

Questions:

1. How has your participation in the ZTL waste management project impacted your recycling rate at home?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

2. In what ways has your behaviour in reducing, reusing, and recycling (RRR) changed since joining the project?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

3. How has your view of waste changed since participating in the project?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

4. Have you started or increased your gardening practices as a result of the project's education and resources on composting and organic waste management?

○ 1 ○ 2 ○ 3 ○ 4 ○ 5

Appendix 3 – Longer Questions relating the Five Capitals:

Open ended questions related to the 5 capitals:

Human Capital:

- How has your work in waste management contributed to your professional growth and development?
- How has your experience in waste management impacted your perspective on environmental sustainability?
- How has your work in waste management impacted your overall job satisfaction and motivation?
- What role does your work in waste management play in your future career aspirations and goals?

Social Capital:

- How has your work in waste management impacted your relationships with co-workers and community members?
- How has your work in waste management influenced your understanding of environmental issues and community concerns?
- How has your work in waste management impacted your reputation or personal brand?

Financial Capital:

- How does your work in waste management impact your overall financial stability?
- How has your work in waste management contributed to your long-term financial goals and plans?

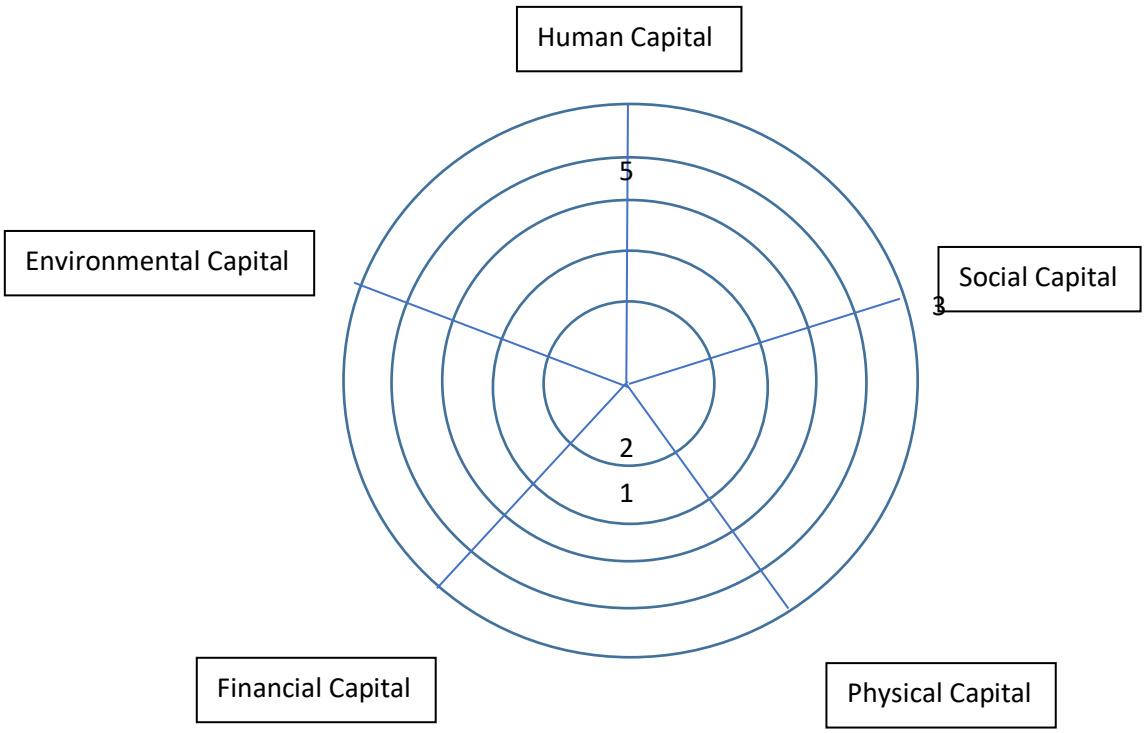
Physical Capital:

- How does your work in waste management impact your access to affordable transportation and safe housing, and affordable energy?
- How has your involvement affected your spending/buying habits

Environmental Capital:

- How has your work in waste management influenced your awareness and understanding of environmental issues?
- Have you made any changes to your personal habits to reduce waste and minimize your impact on the environment?

Appendix 4: Amoeba Diagram



Appendix 5: Questions used in management interview:

1. How do you measure the success of the Zero To Landfill (ZTL) project in terms of waste reduction and creating employment opportunities for the community?
2. Can you describe the training and support provided to the part-time workers involved in the project, and how it contributes to their skill development and personal growth?

3. In what ways does the ZTL project contribute to the improvement of workers' livelihoods in terms of income generation and access to basic services and resources?
4. How does the ZTL project foster social capital and community involvement, and what do you think is the impact of the project on the surrounding communities?
5. What challenges have you faced in implementing the ZTL project, and how have you addressed these challenges to ensure the project's sustainability and success?
6. Can you describe any changes in the workers' well-being and job satisfaction that have resulted from their involvement in the project?

Appendix 6: New participants questions

1. What are your expectations of participating in the ZTL project?
2. What are you hoping to gain from this experience?
   What is your ideal job and how do you think your participation in the ZTL project will help you achieve it?
3. What do you enjoy about working at ZTL so far?
4. In what circumstances would you consider leaving your role?
5. What is your current understanding of the role waste management plays in environmental sustainability?
6. What are your personal habits when it comes to discarding waste?
7. What challenges are you expecting to face during your participation in the ZTL project?
8. What previous work experience do you have and how do you think it will help you in this position?
9. What difficulties or challenges are you facing in your life that you hope this job might help you overcome?

Appendix 7: Questions for head gardener & site manager

1. Could you elaborate on the integration of the ZTL Project with the overall mission and activities of the eco-village, particularly focusing on its role in waste management and the community garden's place within these objectives?
2. How has the ZTL Project impacted the livelihoods of the involved employees, and in what ways has it provided opportunities for previously unemployed individuals? Can you provide some specific examples?

3. Have there been noticeable changes in employees' understanding and attitudes towards waste management since their involvement in the ZTL Project?
4. How has the ZTL Project contributed to the local economy and community, especially in providing opportunities for disadvantaged individuals, and what has been the community response to it?
5. What challenges have been encountered in the implementation of the ZTL Project and how have they been addressed? Are there lessons learned that could be applied to similar future community projects?
6. Lastly, how does the ZTL Project align with broader efforts to promote sustainability and environmental stewardship in the Oude Molen Eco Village?

Appendix 8: December Check-in questions

1. How long have you been involved with ZeroToLandfill?
2. What has been your main role/ place of work since starting at Zero?
3. How is the work going for you? Rate 1 – 10 with 1 being very bad and 10 being excellent.
4. Do you have any problems with the work/ people you work with or anyone else?
5. Do you have any advice on what could be improved?
6. How do you rate the teamwork 1 – 10 with 1 being very bad and 10 being excellent? How could this be improved?
7. Rate your sense of pride in the job 1 – 10?
8. Have you seen any changes in yourself since you started working at Zero?

Table 9 – Key themes in each capital as cited by participants

Capital and theme	**Number of Participants**
Human Capital	
Skill Development and Self-Sustainability	5
Financial Motivation and Future Planning	2
Practical Implementation of waste management at home	3
Valorisation of waste	2
Motivation through Skill Development and Leadership	4

Dissatisfaction Due to Unfulfilled Promises and Work Conditions	3
Financial Constraints Affecting Job Satisfaction:	2
Passive Job Satisfaction	2
Increased Job Satisfaction Due to Team Expansion	1
Passion for the Industry Amidst Challenges	1
Entrepreneurial Aspirations	3
Career Skills for Unrelated Fields	2
New Interests and Career Paths	3
Negative Impact on Career Development	1
Indifference to the Sector	2
Social Capital	
Improved Co-worker Relationships	9
Sense of Family and Close-Knit Teams	2
Community Involvement and Impact	2
Skill and Role-Based Social Capital	2
Community Impact and Empowerment	2
Personal Behavioural Changes	3
Connection to Livelihood	1
Lack of Educational Outreach	1
Positive Recognition from community	6
Community Empowerment	2
Financial Capital	
Positive Impact on finances	5
Small change	2
Negative impact	2

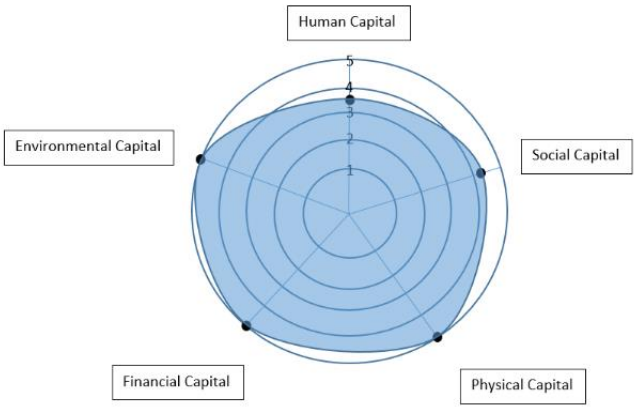
Assistance in meeting basic needs	3
Positive outlook on long-term planning	3
Neutral stance on long-term planning	5
Increased saving and more disposable cash	1
Physical Capital	
Improved access to electricity & transport	3
Limited financial capacity to improve access to electricity and transport	4
Increased food spending	4
Change in food choices	1
Ability for bulk buying	1
Strain on transport budget	1
Insufficient for excess spending	1
Lack of sanitation supplies at work	1
Environmental Capital	
Increased Environmental Awareness and Practical Application:	9
Comprehensive Understanding of Waste Management	3
Community Impact	2
Value-based shift in waste	1
Active advocacy and teaching of recycling and composting	1
Incorporating composting at home	2
Improved waste management at home	5
Recycling at home	2
Home gardening	1

Participants	Human	Social	Financial	Physical	Environmental	Total
1 – Sorter	3,5	4,2	5	5	5	22,7
2 – Collector	2,7	3,2	2	2,6	3,5	14
3 – Sorter	4,5	4,7	3,8	4,3	4,5	21,8
4 – Sorter	2,8	4	3,2	3,4	4,5	17,9
5 – Sorter	1,8	3,3	3,2	3	3,3	14,6
6 – Sorter	1,6	2,7	2,6	2,8	3,5	13,2
7 – Sorter	1,6	3,2	3,2	2,5	3,3	13,8
8 – Sorter	3,7	4,3	2,6	3	5	18,6
9 – Gardener	3,9	4,5	1,8	3,4	5	18,6
10 – Collector	3,6	3,6	4,4	3,2	4	18,8
11 – Gardener	4,1	4,2	4,8	4	3,5	20,6

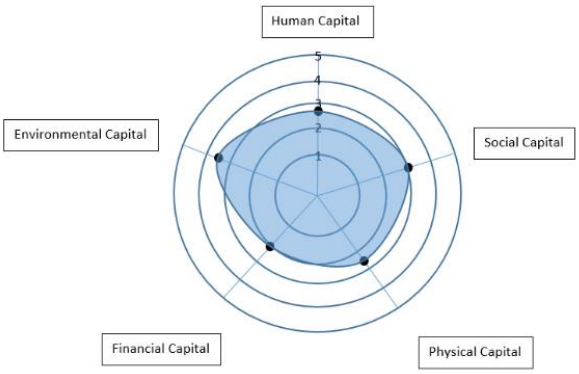
Table 7: Data used to create Bar graph 2 (Taken from table 5)

Appendix 9: Amoeba diagrams for 11 participants and group average:

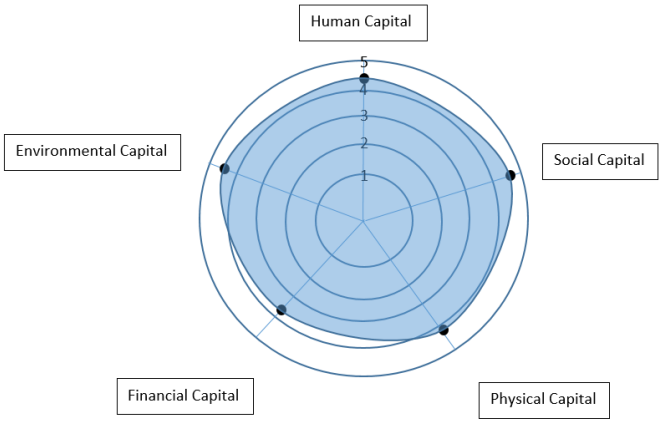
Participant #1



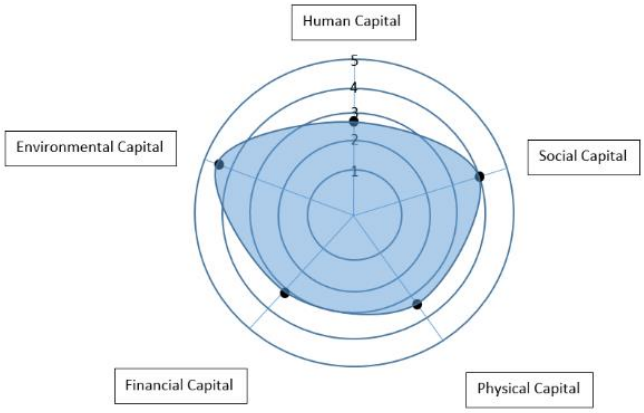
Participant #2



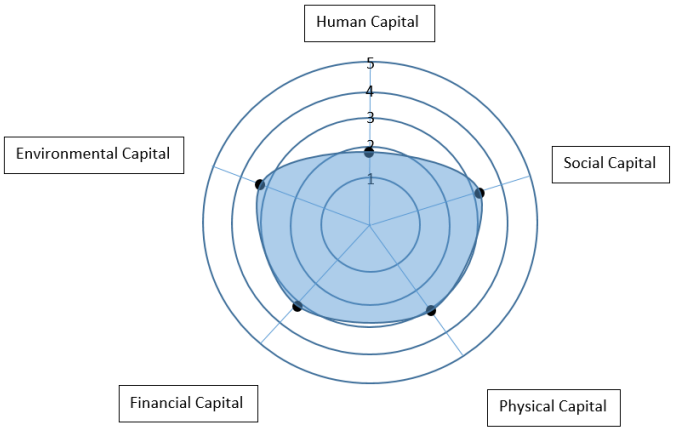
Participant #3



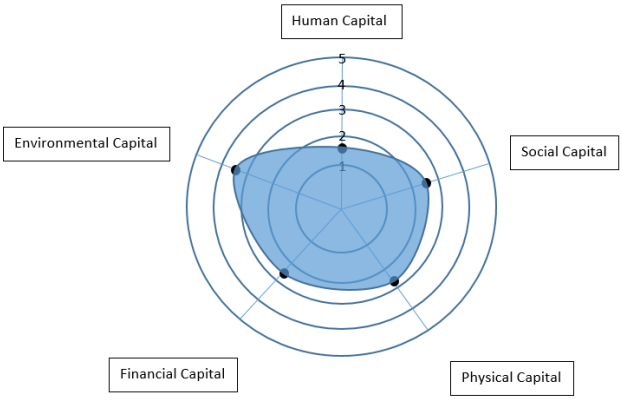
Participant #4



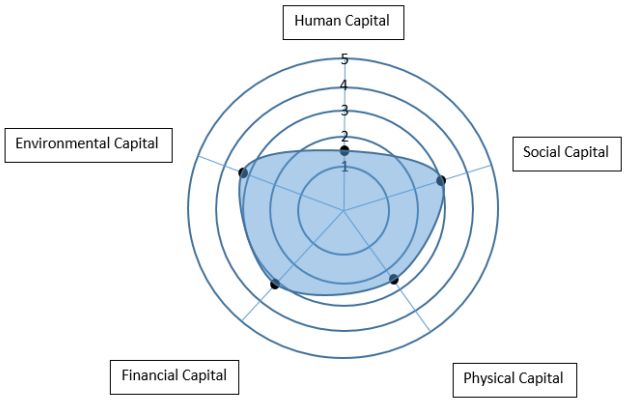
Participant #5



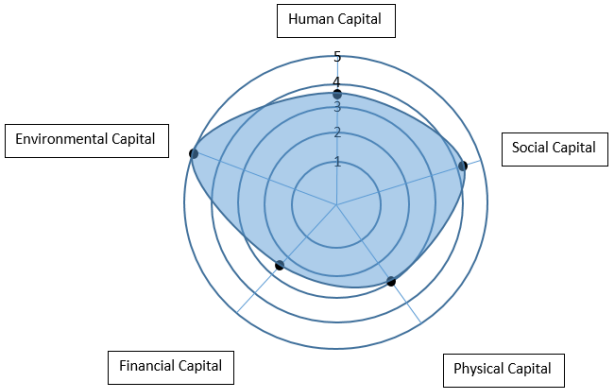
Participant #6



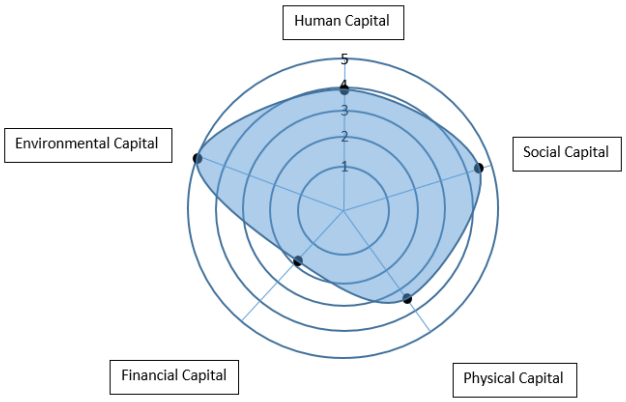
Participant #7



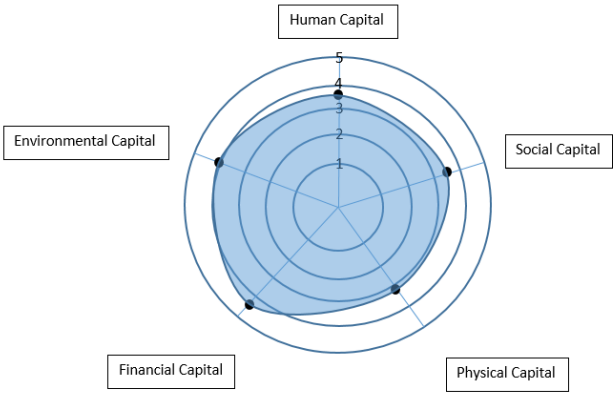
Participant #8



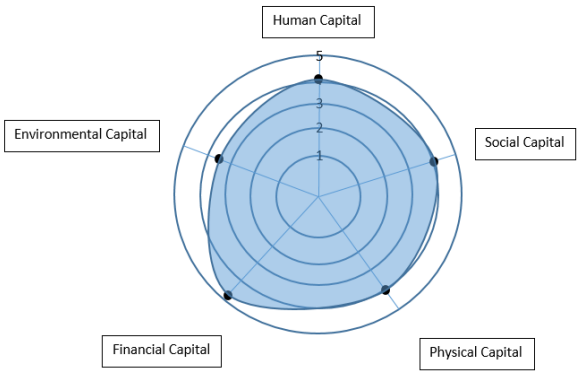
Participant #9



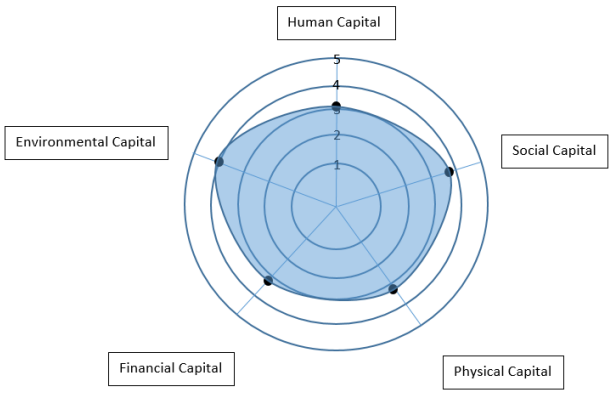
Participant #10



Participant #11



Average Score between 11 participants



4.10) Table 5: Breakdown of Five Capitals Questionnaire

Likert Scale Data set												
Participant number (red female / blue male)	1	2	3	4	5	6	7	8	9	10	11	**Averages**
Position	sorter	collector	sorter	sorter	sorter	sorter	sorter	sorter	gardener/ composter	collector	gardener/ composter	
Age	41	49	?	38	25	23	34	36	?	?	34	
Satisfaction Index (Scale 1-5)												
Questions:												
How satisfied are you with your work place?	3	3	4	1	3	1	1	3	3	4	3	
How well does your workplace meet your expectations?	1	2	4	3	2	2	1	2	3	3	5	
How close is your work place to your ideal job?	4	1	3	4	1	1	1	4	2	3	3	
Does management support you in your job?	1	3	5	1	1	1	1	3	3	4	4	
Are you provided with the necessary tools and training to do your job effectively?	1	1	5	2	1	1	1	1	4	1	4	
Do you feel like you are growing in your career?	3	4	5	5	3	2	1	5	4	4	3	
Totals	**2,1666667**	**2,333333**	**4,3333333**	**2,6666667**	**1,833333**	**1,3333333**	**1**	**3**	**3,166666667**	**3,166666667**	**3,666666667**	**2,606060606**
WAMI Inventory - meaning index (Scale 1-5)												
Statements:												
I find my work in waste management meaningful.	5	1	5	1	2	3	3	4	4	4	3	
My work in waste management contributes to my personal growth.	5	3	4	3	3	3	1	3	4	4	4	
I understand how my work in waste management contributes to my lifes purpose.	4	2	4	4	2	3	1	5	4	2	5	
I have a good sense of what makes my work in waste management meaningful.	5	5	5	3	3	1	3	4	4	3	5	
I know my work in waste management makes a positive difference in the world.	5	5	5	4	1	5	4	5	5	4	4	
My work in waste management helps me to better understand myself.	5	3	4	2	1	5	1	5	5	5	5	
I have discovered work in waste management that has a satisfying purpose.	4	4	5	4	2	2	3	4	5	5	5	
My work in waste management helps me make sense of the world around me.	5	2	5	4	1	1	1	5	5	5	4	
The work I do in waste management serves an important purpose.	5	3	5	1	1	3	3	4	5	5	5	
Totals	**4,7777778**	**3,111111**	**4,6666667**	**2,8888889**	**1,777778**	**2,8888889**	**2,222222222**	**4,333333333**	**4,555555556**	**4,111111111**	**4,444444444**	**3,616161616**

The Five capitals - Appendix 2: (Scale 1-5)												
Social Capital												
How has participating in the ZTL project impacted your sense of gratitude towards your community and environment?	5	3	5	4	4	1	4	3	5	4	4	
How has participating in the ZTL project impacted your sense of belonging?	5	4	5	3	3	4	4	5	5	2	5	
How has participating in the ZTL project impacted your ability to make positive changes in your community and environment?	5	4	4	5	3	4	3	5	5	5	5	
How has your self-esteem been affected by your involvement in the ZTL project?	5	2	5	5	4	3	1	4	5	4	4	

How has participating in the ZTL project impacted your mental health?	4	3	4	4	3	3	4	5	4	4	4	
How has your stress level been affected by your involvement in the ZTL project?	1	3	5	3	3	1	3	4	3	2	3	
Totals	**4,1666667**	**3,166667**	**4,6666667**	**4**	**3,333333**	**2,6666667**	**3,166666667**	**4,333333333**	**4,5**	**3,5**	**4,166666667**	**3,787878788**
Financial Capital												
How has the Zero To Landfill (ZTL) waste management project impacted your access to food or food purchasing?	5	3	4	3	4	1	4	1	2	5	5	
Has your participation at ZTL improved your financial stability to deal with unexpected events or shocks?	5	1	3	3	3	1	3	2	1	4	5	
Has your participation at ZTL had any impact on your access to reliable power or electricity?	5	2	4	4	3	4	3	4	2	3	5	
Have any improvements been made to homes or the ability to purchase appliances or tools as a result of your working at ZTL?	5	3	4	2	3	4	3	3	2	5	5	
Have there been any changes in your households' access to education, particularly for children, due to participation in ZTL?	5	1		4	3	3	3	3	2	5	4	
Totals	**5**	**2**	**3,75**	**3,2**	**3,2**	**2,6**	**3,2**	**2,6**	**1,8**	**4,4**	**4,8**	**3,322727273**
Physical Capital												
How has your participation in the ZTL project affected your access to transportation?	5	2	5	5	2	1	3	3	3	3	4	
Has your participation in the project improved your access to safe housing?	5	2		3	3	3	3	3	3	3	4	
Has your participation in the project impacted your access to adequate water supply and sanitation?	5	3	4	1	3	4		3	3	4	4	
How has the physical capital provided by the project affected your ability to perform your job effectively?	5	2	4	3	3	5	1	2	3	2	3	
How has participating in the Zero To Landfill project contributed to your personal development in terms of acquiring new skills and knowledge related to physical capital?	5	4	4	5	4	1	3	4	5	4	5	
Totals	**5**	**2,6**	**4,25**	**3,4**	**3**	**2,8**	**2,5**	**3**	**3,4**	**3,2**	**4**	**3,377272727**
Environmental Scale												
How has your participation in the Zero To Landfill waste management project impacted your recycling rate at home?	5	3	5	4	3	3	3	5	5	4	3	
In what ways has your behaviour in reducing, reusing, and recycling (RRR) changed since joining the project?	5	4	4	5	3	4	3	5	5	4	3	
How has your view of waste changed since participating in the project?	5	3	5	4	4	4	4	5	5	5	4	
Have you started or increased your gardening practices as a result of the project's education and resources on composting and organic waste management?	5	4	4	5	3	3	3	5	5	3	4	
Totals	**5**	**3,5**	**4,5**	**4,5**	**3,25**	**3,5**	**3,25**	**5**	**5**	**4**	**3,5**	**4,090909091**