Finance for sustainability: How European actors can support sustainable small and medium-sized enterprises in Nigeria

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Maja Biemann

Supervisor: Guus van Westen

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Supervisor: Josefine Koehler

Summary

To address the challenge of mismanaged plastic waste in Nigeria, this research investigates the main research question '*How can European actors financially support SMEs active in Nigeria's plastic waste management as a means to aid in achieving the local sector's sustainability transition?*'. To answer this, a mixed-method approach was applied, including the review of the existing literature base, collecting insights from Nigerian SMEs through an online survey and conducting actor interviews with individuals working in SMEs, investors and further actors relevant to the topic. The approach of service regimes by Welie et al. (2018) was applied to uncover the various services underlying the complex system. Accordingly, Nigeria's plastic waste management sector has shown to consist of several service regimes that are insufficiently aligned, hampering sustainability on the sectoral level. Thereby, the Nigerian government is not the most suitable actor to address this since the consequences of Nigeria's oil-dependency negatively impact the governmental framework. Instead, SMEs were identified as promising potential actors of change. Their position in the sector enables them to create interlinkages across several services. If incentivized, those links can be used to increase the sector's sustainability and keep plastics from being mismanaged while simultaneously supporting the prosperity of the informal sector, for example. Due to the consultation of employees and investors, challenges and opportunities related to that were identified. Based on the findings, recommendations for the design of financial instruments for development finance were derived. Besides supporting the chances for the SMEs' long-term survival, the recommendations address aspects like offering a greater variety of financing instruments to the SMEs and better considering the local context. Great importance was also dedicated to increasing transparency which can also contribute to reduced corruption. Furthermore, mutual learning should enable entrepreneurs to develop skills relevant to the waste sector and the business.

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List of abbreviations

AA	German Federal Office
ACCP	African Clean Cities Platform
ACEN Foundation	African Circular Economy Network Foundation
AEPB	Abuja Environment Protection Board
AfDB	African Development Bank
BMZ	German Ministry for Economic Cooperation and Development
BOI	Bank of Industry
BPF	British Plastics Federation
CEAP	Circular economy action plan
CEIP	Circular Economy Innovation Partnership
CGD	Center for Global Development
CSR	Corporate Social Responsibility
DAC	Development Assistance Committee
DFID	Department for International Development
EAG	External Action Guarantee
EGD	European Green Deal
EIB	European Investment Bank
EIF	European Investment Fund
EFSD+	European Fund for Sustainable Development Plus
EPA	Economic Partnership Agreement
EPR	Extended Producer Responsibility
EU	European Union
EUR	Euro
FMEnv	Federal Ministry of Environment (Nigeria)
GBP	Great Britain Pounds
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GPAP	Global Plastic Action Partnership
HDPE	High-density polyethylene
ICIR	International Centre for Investigate Reporting
IFC	International Finance Cooperation
ISA	International Sustainability Academy

kg	Kilogramme
KPI	Key performance indicator
kt	Kilo tonnes
LAWMA	Lagos Waste Management Agency
LDPE	Low Density Polyethylene
LPO	Local Purchase Order
MFF	Multi-annual Financial Framework
MFI	Micro-finance institution
MIP	Multiannual Indicative Programme
MNC	Multinational corporation
MSMEs	micro, small and medium-sized enterprises
NBS	National Bureau of Statistics
NCIC	Nigerian Climate Innovation Center
NCEP	Nigeria Circular Economy Programme
NCEWG	Nigeria Circular Economy Working Group
NGO	Non-governmental organisation
ODA	Official Development Assistance
OECD	Organisation for Economic Co-Operation and Development
OECD DAC	OECD Development Assistance Committee
PA	Paris Agreement
PET	Polyethylene Terephthalate
PP	Polypropylene
PPE	Personal protective equipment
PPPs	Public-private partnerships
PS	Polystyrene
PVC	Polyvinyl Chloride
RAN	Recyclers Association of Nigeria
RMRDC	Raw Materials Research and Development Council
rPET	recycled PET
RC PTS	Recycredits
RVO	Rijksdienst voor Ondernemend Nederland
SDG	Sustainable development goal
SMEDAN	Small and Medium-sized Enterprises Development Agency of Nigeria
SSA	Sub-Saharan Africa

SUP	Single-used plastics
UNFCCC	United Nations Framework Convention on Climate Change
UPR	Ultimate Producer Responsibility
UK	United Kingdom
UNIDO	United Nations Industrial Development Organisation
USD	US-Dollar
WEF	World Economic Forum

1 Introduction

Plastic polymers are used in products ranging from water bottles to aircraft components due to their ease of manufacturing and other characteristics like being light and cheap (Fortune Business Insights, 2021). Simultaneously, plastics cause environmental and societal challenges. About 300 million tonnes of plastic waste are globally produced per year which must be treated. However, current plastic waste management, a sub-category of solid waste management, is unsustainable (United Nations Environment Programme (UNEP), 2022). The Global Plastic Outlook database of the Organisation for Economic Cooperation and Development (OECD) published that in 2019, 9% of global plastic waste was recycled, 19% incinerated, 49% landfilled and 22% mismanaged. Mismanaged waste is littered or inadequately disposed of, ending up at uncontrolled dumpsites, in open fires or water bodies (Organisation for Economic Cooperation and Development (OECD), 2022). Once in the environment, the traditionally non-biodegradable plastics remain there for centuries (Zhang et al., 2021). Nonetheless, the global demand for plastics is expected to keep growing from 368 million metric tonnes in 2019 to 589 million metric tonnes by 2050 due to population growth and the increasing needs of the textiles and packaging industry, for example (Fortune Business Insights, 2021; Plastic Soup Foundation, n.d.; Tiseo, 2021). The increasing plastic consumption will subsequently lead to more waste generated. Already today many countries suffer from mismanaged plastic waste with the consequences on human health and environmental degradation being especially visible in less-developed countries (e.g. Egun & Evbayiro, 2020).

Calil et al. (2021) identified plastic pollution being an environmental justice challenge to vulnerable groups worldwide. The authors identified power imbalances between the Global North and Global South. Although Global South countries are historically not the main ones responsible for plastic pollution, they face most of the burdens due to hazardous disposal. Additionally, global trade with plastic waste for recycling is accompanied by transferring risks for the environment and health. Moreover, the Global South is challenged by underdeveloped waste disposal capacities and illegal shipments. Simultaneously, costs for clean-ups, for example, are not globally shared (Stoett, 2022). Earlier this year, the United Nations (UN) agreed on developing an international legally binding agreement to end plastic pollution by 2024 (United Nations, 2022). In paragraph 3(n), this resolution demands specifications on capacity-building, technical assistance, technology transfer and financial assistance since the instrument's success depends on their adequate provision (United Nations Environment Programme, 2022).

One of those countries fighting plastic pollution is Nigeria. The federal country consists of 36 states and the Federal Capital Territory (FCT), has more than 210 million inhabitants and is Africa's largest economy (World Bank Group, 2022). Nigeria has globally the 11th highest annual plastic emission into

the ocean, impacting water systems and wildlife (Jambeck et al., 2015; Meijer et al., 2021). Its land-based plastic waste is treated via incineration, landfill fires and open burning, causing greenhouse gas (GHG) emissions and poor air quality (Egun & Evbayiro, 2020; Federal Ministry of Environment (FMEnv), 2020). This results in respiratory problems which are expected to cause shorter life expectancy and weaken the labour force (FMEnv, 2020). Moreover, plastic pollution impacts the local economy. For example, the shipping sector is negatively affected by marine litter because of fouled motors and the fishing industry struggles with illegally discarded nets. Furthermore, the tourist sector and recreation activities as well as livestock farming and operational activities face potential financial losses due to visual soil pollution, the reduction of arable areas and declining agricultural output, among others. Additionally, high usage of single-use plastics (SUPs) leads to losses in the value of packaging materials (FMEnv, 2020). These challenges are likely to be increased by Nigeria's continuous population growth and economic development. Besides people becoming able to consume more, big businesses are attracted to Nigeria. For example, the largest petrochemical refinery in Africa, Dangote refinery, is based in Lagos and commenced its operations in 2021. This is likely to improve the economy but might also increase plastic pollution if waste production is uncontrolled (Oladipupo, 2020). Thus, Nigeria must accelerate the first undertaken attempts to address the problems. For example, the Federal Government of Nigeria released the National Policy on Plastic Waste Management in 2020 (FMEnv, 2020).

However, governmental endeavours are insufficiently enforced. Due to its richness in oil resources, Nigeria evolved as a rentier state, meaning that it focuses its economy on the revenues generated by trading oil, neglecting taxes from society and a diversified economy (Omeje, 2006). Nonetheless, Nigeria attracts international investments for expanding its infrastructure for sustainable waste management (Karadima, 2022). If effectively used, this increasing interest of investors could support the plastic waste treatment sector, thus a non-oil sector. The timing for putting effort into further attracting those investments is good considering that China banned plastic waste imports in 2018. Consequently, most wastes were exported to other South-East Asian countries but their capacity was insufficient to handle those large amounts (Calil et al., 2021). Thus, high-income countries, including European ones, had to rethink their waste management habits.

1.1 Nigeria and Europe

The case of Nigeria and Europe is well suited to explore what adequate financial assistance could look like. The European Union (EU) is Nigeria's most important trading partner in oil and non-oil exports and announced to support Nigeria's economic development. Europe intervenes in Nigeria since the 1970s, with increasing activity since Nigeria signed the Cotonou Agreement in 2000 (Bakare, 2019). So far, this development aid has not been successful but negatively affected human development instead

(Decker, 2012). Nonetheless, European countries bilaterally cooperate with Nigeria, like the United Kingdom (UK), Germany and France (e.g. Department for International Development, 2020). Furthermore, the EU channels investments to sub-Saharan Africa (SSA) through its financial instrument for neighbourhood, development and international cooperation, short NDICI-Global Europe instrument (Sergejeff et al., 2022) Additional to traditional development cooperation with the government, the EU established instruments to engage with Nigeria's private sector to promote job creation and the development of an inclusive economy, thereby involving the European private sector (EU Delegation to Nigeria, 2021). Most of the projects focus on agriculture but it is acknowledged that pollution from plastic waste undermines Nigeria's improvement potential. Thus, waste management is identified as one of the challenges to Nigeria's sustainable development. Thereby, the EU wants to implement circular economy principles and targets small and medium-sized enterprises (SMEs), among others (Rajput et al., 2020). SMEs account for the majority of the Nigerian economy but predominantly rely on informal funding and self-financing (Agence Francaise de Développement (AFD), n.d.; PricewaterhouseCoopers (PwC), 2020). Formal financial institutions in SSA are often reluctant to finance SMEs because of high risks of default, insufficient competition, poor guarantees and lacking information about the enterprises' ability to repay. Non-banking intermediaries, such as microfinance institutions (MFIs) try to fill the gap but cannot support SMEs when they expand (Kauffmann, 2005).

However, ECDPM found the EU's effort to be broadly failing to expand already existing initiatives in Africa. Instead, the efforts were one-sided and focus on problems relevant to Europe, excluding aspects within Europe causing problems in Africa. Accordingly, the planned investments are found to only consider European needs and do not reduce existing imbalances in the EU-Africa relationship (Bilal, 2022). This illustrates the need for improving the design of investments.

1.2 Knowledge gap

Current academic papers extensively assess plastic pollution in Nigeria (e.g. Dumbili & Henderson, 2020; Duru et al., 2019; United Nations Industrial Development Organization, 2021). These mostly cover the urban areas of Lagos and Abuja and focus on the role and challenges of the informal sector (e.g. Gall et al., 2020; Velis, 2017) and the prospects of a circular economy (e.g. Gall et al., 2020; Rajput et al., 2020; Rijksdienst voor Ondernemend Nederland (RVO), 2020).

Also, the challenges of SMEs are studied (Haselip et al., 2014; Mambula, 2002; Small & Medium Enterprises Development Agency of Nigeria (SMEDAN), 2021). According to PwC (2020), the most pressing ones were finding costumers (16%), infrastructural deficits (15%), insufficient cash flows (14%), unskilled workforce (7%), competition (7%) and taxation (7%), regulatory and judiciary processes (4 and 1%) and corruption (2%). However, the most important one was obtaining finance and funding (PwC, 2020; The World Bank, n.d.). PwC (2020) estimated the annual financing gap for

micro, small and medium-sized enterprises (MSMEs) to be about EUR1.4 billion pre-Covid-19. According to the CBN annual statistical bulletin, the credit market for SMEs is insufficient, with small businesses receiving less than 1% of total commercial banking credit in 2018. The National Bureau of Statistics (NBS) stated that less than 5% of SMEs could access adequate finance for working capital and growth and expansion funding (PwC, 2020). As such, SMEs were identified as the 'missing middle' between micro-sized and large companies (e.g. Ciuci Consulting, 2018; Kauffmann, 2005).

Other studies that investigate how to address this financial gap, mostly refer to the involvement of the private sector (Ayeni, 2020; Biau et al., 2008; Clark et al., 2018; Fagbola et al., 2015). However, research on how to make those work in practice is rather scarce. Also, the relationship between Europe and Nigeria is underresearched. This might become especially relevant since the European Green Deal (EGD) is likely to soon impact the EU's trading partners (Rajput et al., 2020).

1.3 Research objective

Thus, this paper aims to take the research ahead, aiming to develop new scientific knowledge to improve the international financial support to Nigerian SMEs engaging in plastic waste management. The research objective is to explore how financial support from European actors should be designed to meet the needs of Nigerian SMEs. For this, the main research question will be investigated:

How can European actors financially support SMEs active in Nigeria's plastic waste management as a means to aid in achieving the local sector's sustainability transition?

To answer this, the following sub-questions will be answered:

1. What is the current state of sustainability in the plastic waste management sector in Nigeria?
2. What is Nigeria's political agenda regarding the sustainability transition, focused on the plastic waste management sector?
3. What is the role of Nigerian SMEs in the country's plastic waste management?
4. What challenges and opportunities do the SMEs face when receiving financial support from European actors?
5. Which recommendations for European actors result from this regarding providing financial support to Nigerian SMEs active in the plastic waste management sector?

1.4 Scientific and societal relevance

This report has scientific relevance since big companies and the informal sector dominate public interest and academic literature regarding promoting sustainable development. Thus, this research can contribute to optimizing international development aid for SMEs, aiming at achieving the SDGs. It seeks to inform European investors in designing their financial instruments and allows SMEs to

integrate their opinions. Additionally, it might inform the Nigerian government in establishing the needed environment for SMEs to thrive.

This report's societal relevance is caused by the need to address Nigeria's challenges of the increasing pressures through mismanaged plastic waste. SMEs, as innovative actors, can develop solutions tailored to Nigeria and thereby contribute to environmental protection and employment, for example. But their ability to develop is limited due to limited available financing, among others. Thus, the positive aspects SMEs can have on sustainable development can be promoted by uncovering how monetary flows can be best channelled to the SMEs. Simultaneously, this contributes to ensuring that no one is left behind when financing SSA countries for sustainable development.

To answer the research questions, this report continues by explaining the concepts underlying the research. Afterwards, the applied methods are outlined. Chapter 4 investigates the current status of sustainability in Nigeria's plastic waste management, Chapter 5 illustrates the sector's goals and Chapter 6 uncovers the role of SMEs in achieving this. Chapter 7 summarised the results of the online questionnaire and actor interviews. Chapter 8 critically discusses the findings, followed by the conclusion.

2 Conceptual framework and definitions

This research addresses topics related to sustainability and international development aid in the Nigerian context. Those concepts often lack clear descriptions, hence, the following chapter elaborates on the applied definitions. First, sustainability transitions are explained to illustrate the complexity underlying a sector's development. For that, the concept of sector and service regimes is introduced. Afterwards, the concept of sustainability applied to the plastic waste management sector to set the boundaries for this research and explain the predominance of recycling as a sustainable waste treatment method. Then, SMEs are defined and, finally, financial support for sustainable development is discussed.

2.1 Sustainability transitions

According to Chang et al. (2017), transitions are fundamental changes in socio-technical systems, such as a specific sector, transforming the basic character of society. Marard et al. (2012) found transitions to evolve over decades and uprise new organisations and business models, complementing or replacing existing ones. They affect various social domains by causing complementary technological and non-technological innovations, such as changes in infrastructure, as well as changes in technological and institutional structures and consumer attitudes. Van Welie et al. (2018) further developed the approach by Marard et al. (2012) to make it applicable to cities in the Global South and to better cover the heterogeneity and complexity inherent in those sustainability transitions. They

introduced service regimes built upon interlinked and institutionalised technologies, user behaviour and organisational forms of the service provision. For example, the service of public transport would be a means for mobility sector. Multiple service regimes form a sectoral regime. To justly transition a sector towards greater sustainability and higher quality, the strengths and obstacles to transformation of both a service-regime itself as well as the interactions inherent of one regime and among multiple service regimes must be understood. The authors state that well-aligned sectoral regimes secure that service regiemes complement each other due to aligning sectoral regulations, users can access various matching and complementary service regimes and a shared infrastructure exists that covers multiple service regimes. As typical for service provision in developing cities, they identified Splintered service regimes. This describes a sectoral regime that consists of service regimes which are partially internally aligned. However, connections between multiple service-regimes are misaligned at the sectoral level. Being aware of those interlinkages enables alternative future configuriations on the sectoral level. One leverage for transition would be to improve the relations among service-regimes, for example. Thereby, the level of sustainability of such a transition is case-specific (van Welie et al., 2018).

Transitions can be considered sustainable if they aim at more sustainable technologies, consumption and production. The perception of sustainability, and thus what guides such a transition, changes over time, space and personal perception. Nonetheless, long-term goals can inform them and make transitions intended (Markard et al., 2012). This study considers the Sustainable Development Goals (SDGs) as the targets for sustainability transitions. Despite the SDGs being criticised for their top-down governance (e.g. Hajer et al., 2015) and challenges regarding translating them into practice (e.g. Biermann et al., 2017), they cover aspects of the triple-bottom-line and are generally accepted by institutional and governmental stakeholders (Williams & Robinson, 2020). Additionally, the Paris Agreement (PA) defines sustainability goals since it is guiding the decision-making for the Global Gateway Africa – Europe Investment Package which dedicates EUR150 billion to Africa through Team Europe initiatives (European Commission (EC), 2022b).

Sustainability transitions happen on multiple dimensions, including behavioural, economical and socio-cultural ones, and include various actors, such as governments, customers and industries (Markard et al., 2012). Thereby, governance and guidance are key, attributing importance to political, regulatory and institutional actors (Smith et al., 2005). However, transitions are increasingly governed by transnational actors, located at places different to where the transition takes place. These can include multi-national enterprises, multi- or bi-lateral donors or non-governmental organisations (NGOs) (Truffer et al., 2015). Sustainability transitions and their pathways demand tailored governance to address the lock-ins and path-dependencies in which socio-technical systems are stuck. This means that without interventions, unsustainable production and consumption patterns remain because existing technologies are interwoven with customer behaviour, lifestyles, business models, value

changes and institutional and political structures (Markard et al., 2012). This is especially relevant to Nigeria in the context of its oil resources negatively impacting the country's institutional quality due to corruption and, thus, eventually hampering economic growth. This natural resource curse resulted in the country's poor economic performance in the long term (Subramanian & Sala-i-Martin, 2003). Additionally, plastic waste management as a system affected by globalisation demands a multi-scalar approach beyond national evaluation. The development of those transitions is shaped by transnational linkages of actors, knowledge, capital, institutions and technology (Truffer et al., 2015).

To develop pathways for sustainability transitions in the plastic waste management sector, it must be understood what the goals of sustainable plastic waste management are. This is elaborated in the following section.

2.2 Sustainable plastic waste management

Plastic waste management covers the methods and approaches for reprocessing domestically produced or imported plastic material, instead of dumping it into landfills, water bodies or other environmental areas (Gall et al., 2020). This service-based sector includes the collection, sorting and treatment of all wastes produced along a value chain (Barrowclough et al., 2020; Grand View Research, 2020).

SDG 12.5 demands to "substantially reduce waste generation through prevention, reduction, recycling and reuse" by 2030 (United Nations, 2020). Thus, sustainable waste management often means the application of the waste hierarchy by Price and Joseph (2000) to guide policy-making for improving waste management's sustainability (e.g. Gertsakis & Lewis, 2003). Thereby, some treatment methods are more environmentally preferable than others. These are in decreasing preferential order:

- Prevention (reducing resources used in manufacture, increasing life span, reducing material use)
- Preparing for reuse (Repairing, cleaning, refurbishing, checking)
- Recycling
- Other recovery (Incineration for energy production, anaerobic digestion, etc)
- Disposal (Landfill or incineration without energy production)

The authors also stressed the importance of demand reduction, however, as the focus of the paper is on waste management, this is out of the scope of this research (Price & Joseph, 2000). As indicated by Pires and Martinho (2019), the waste hierarchy sees prevention as the highest sustainability goal, whereas circular economy favours recycling. However, it is expected that recirculating material flows promote waste prevention. This means that waste prevention can be achieved if products are reused, refurbished and re-manufactured (Pires & Martinho, 2019). Since the report at hand is mainly

motivated by addressing the already existing plastic pollution and does not address changing consumption patterns, circular economy aspects are considered as contributing to sustainable waste management instead of thriving for the highest strategies in the waste hierarchy.

Gertakis and Lewis (2003) identified environmental, economic and social impacts as well as avoided impacts of specific waste management methods, as summarised in Table 1. While the environmental benefits of applying treatment methods are commonly agreed on, social aspects are rather neglected in existing research and mostly refer to changing consumer habits. However, for countries like Nigeria and its unregulated waste treatment, impacts on job opportunities, health, labour rights (including child work) and others should be included as well. However, needs to be addressed in further research.

Table 1 Environmental, economic and social impacts and avoided impacts of waste management methods (Gertsakis & Lewis, 2003) with added definitions (Potting et al., 2017).

Treatment method	**Definitions**	**Environmental impacts**	**Environmental impacts (Avoided)**	**Economic impacts**	**Social impacts**
Prevention	Make a product redundant by abandoning its function or by offering the same function with a radically different product	None	Reductions along the whole VC (Materials, energy, emissions, waste)	Potential economic losses to manufacturers	Need to change habits (consumption)
Reduction	Increase efficiency in product manufacture or use by consuming fewer natural resources and materials	none	Reductions along the whole VC (Materials, energy, emissions, waste)	Cost savings for manufacturers	Cost savings for consumers
Reuse	Reuse by another consumer of discarded product which is still in good condition and fulfils the original function	Transport and cleaning processes	Impact of production; Avoided landfilling (air pollution, leachate, visual impact)	New business opportunities (Collection & refurbishment services)	Need to change habits (consumption)
Re-manufacturing	Use parts of a discarded product in a new product with the same function	Transport and (re)manufacturing processes	Impact of manufacturing virgin materials	New business opportunities (remanufacturing)	Need to change habits (disposal, i.e. source sorting); Does not attract changes in consumption
Recycling	Progress materials to obtain the same (high grade) or lower (low grade) quality	Transport and treatment processes	Impact of manufacturing virgin materials; Avoided landfilling	New business opportunities (reprocessing)	Need to change habits (disposal, i.e. source sorting); Does not attract changes in consumption

Energy recovery	Incineration of materials with energy recovery	Transport and energy recovery processes	Energy production from other fuels; Avoided landfilling	New business opportunities (energy recovery)	Possible opposition among communities towards new facilities; Does not attract changes in consumption
Landfill	Not part of the circular economy concept: filling, compacting and covering layers of solid waste for final disposal in an (engineered) pit (Stauffer, 2020)	Transport and landfilling processes	Impact of waste treatment processes	Low disposal costs	Possible opposition among communities towards new facilities

Out of the circular strategies, recycling receives the greatest attention from academic, economic and political action (e.g. IHS Markit, 2021). For example, it guides the EU's Circular Economy Strategy from 2015 (EC, 2015). Recycling is the process of using materials recovered from waste streams to manufacture a new product. It can reduce the demand for virgin materials, fossil fuels and space needed for landfilling (Hopewell et al., 2009). Recycled plastics provide a material source to the industry, reduce the environmental impact of plastic-rich products, minimise the amount of plastic sent to landfills, reduce oil consumption and are more energy-efficient than producing virgin polymers (British Plastics Federation (BPF), 2022). Recycling is especially helpful to minimise disposal under given conditions, without changing lifestyles (Price & Joseph, 2000). Grand View Research (2020) predicted recycling to be the segment with the highest growth rates globally, with 4.9% from 2020 to 2027.

Supporting waste infrastructure is a popular tool for international finance for sustainable cities (e.g. Merk et al., 2012). In the plastic waste value chain, investments can target initial capital expenditures, including infrastructural investments, operating costs, like maintenance and service provision, and product design. Half of those investments are often provided by local governments, the remaining 50% by the national government and the private sector (Green Finance Platform, 2021). However, OECD (2019) found that especially low-income countries tend to rely on external public financing. Thereby, funding sources include the World Bank, the EU and bilateral aid programmes. Occasionally, waste infrastructure projects were launched with co-financing from the business sector. Since the research at hand focuses on SMEs as the recipient of those financings, their characteristics are defined in the following.

2.3 Small and medium-sized enterprises

A general definition of SMEs does not exist and varies depending on the regional and sectoral area studied (e.g. PwC, 2020). According to Haselip et al. (2014), the African Economic Outlook for 2005 prefers to use a qualitative definition in the African context. Examples could be specific issues faced, such as the obstacle to accessing finance, and structural barriers, like lacking management skills and limited knowledge (European Union (EU), 2020). However, because the research at hand studies financing coming from European actors, this report applies the definition by the EU (2020), which is also supported by the European Investment Bank (EIB) and European Investment Fund (EIF). According to this, SMEs are all enterprises which have a headcount between 10 and 249 persons and have either an annual turnover of less than EUR50 million or an annual balance sheet total of less than EUR43 million. Thereby, the headcount includes employees, persons seconded to the enterprise, also temporary employees, owner-managers and partners deriving financial advantages. Excluded are apprentices and students as well as employees on maternity or parental leave. The headcount is a mandatory criterion, whereas only one of the latter two must apply. The characteristics are summarised in Table 2.

Table 2 Overview of SME definition criteria. Based on (European Union (EU), 2020)

Category of enterprise	**Headcount (Mandatory)**	**Annual turnover (EUR million)**	**Annual balance sheet total (EUR million)**
Small	10- <50	2 - <10	2 - <10
Medium	50 - <250	10 - <50	10 - <43

Nigerian-specific definitions of SMEs were similar regarding the headcount but highly differed regarding the financial terms. For example, the Small and Medium Enterprises Development Agency (SMEDAN) (2021) defines SMEs by having 10 to 199 employees and turnovers between EUR58,000 and EUR2.3 million (N25 million and N1 billion, calculated 17.08.2022). Thus, the headcount was the exclusive criteria for this report to consider an enterprise as an SME. This is also in line with the categorization of the UN Industrial Development Organization (UNIDO) for developing countries (Luetkenhorst, 2005).

2.4 Financial support for sustainable development

Finance for sustainable development is development finance targeted at the SDGs and can be both paid and received by public and private actors, respectively (OECD, n.d.-a). Public Official Development Assistance (ODA) is paid by the OECD Development Assistance Committee (OECD DAC) countries and multilateral institutions to low and middle-income countries and can be channelled via grants and technical assistance (TA) which transfers, adapts, mobilises and utilises services, skills, knowledge and technologies to support capacity building (Hauck & Land, n.d.). Further ODA instruments are

concessional and non-concessional loans from development banks or private instruments by revenue-seeking Development Finance Institutions. The latter includes instruments like equity or guarantees. ODA targets the reduction of sustainability issues in developing countries, especially those that lack access to international capital markets (EDFI, 2022). To address the low quantity of ODA, hampering the achievements of the SDGs, the private sector is increasingly demanded to be involved in development finance (e.g. Morozkina, 2018). For this, private sector actors are often included via various partnership programmes. However, those partnerships mostly fail to appropriately implement development, human rights, and environmental aspects in the projects (e.g. Cohen et al., 2021). Since traditional private investors come with their own expectations, differing from the purpose of development aid, this research aims to develop recommendations targeted at public development agencies or private actors that inherently promote sustainability, like NGOs or enterprises with business models for sustainability. The latter means expanding the traditional idea of value creation is expanded to ecological and social values (Schaltegger et al., 2016).

Besides involved actors, the variety of instruments for development finance increased. While grants were less applied, soft loans became more popular. Grants can be favoured as opposed to loans because they avoid the accumulation of debt of the recipient. However, grants also increase the recipient's dependence on the donor country since they have fewer incentives to strengthen fiscal adjustments, for example, to increase tax revenues, and thus result in decreasing domestic revenues. Hence, grants must be linked to policies strengthening domestic institutions (Clements et al., 2004). Soft loans are loans with below-market interest rates and often extended payback periods (FDI India, 2022). Soft loans are expected to have trickle-down effects, resulting in employment and income creation, and enabling projects that could not have been financed otherwise (Fritz & Raza, 2014). Additionally, loans are expected to induce efficient usage of development finance due to incentivising generating revenues because of the burden of repayment (Clements et al., 2004). Other instruments are topic-related bonds, like green or development impact bonds, equity finance, peer-to-peer learning and leasing (Hauck & Land, n.d.).

Finance for sustainable development can reduce inequalities between historically or geographically related more fortunate and poorer countries. It can transfer knowledge and technology and enable countries to leapfrog unsustainable practices (Bell & Hedeshi, 2022). However, development aid is also highly criticised by academia. As such, the engagement of private foundations and corporations can shift decision-making from being based on societal needs to private interests. Thus, aid should be disconnected from profit generation (Bell & Hedeshi, 2022). Moreover, the provision of development aid is often condemned for being utilised by developed countries as a foreign policy instrument in the Global South (e.g. Badarin & Wildeman, 2021). Additionally, while international investors used to be a focal point for mobilising private capital for development, obstacles like high foreign exchange rates

underline the importance of supporting local actors to raise awareness, build capacity and accelerate investments in the local currency. Local actors might also be better positioned than international actors to manage and mitigate key risks due to their local knowledge and social capital (König et al., 2020). Another criticism is that technologies provided through development aid have often too high operation costs and are locally not manageable. It is emphasised that financial support for development must be tailored to the recipient country (Bell & Hedeshi, 2022).

For Nigeria, ODA constitutes an important source of development finance (Organisation for Economic Cooperation and Development (OECD), n.d.-c). The ten largest gross ODA providers to Nigeria between 2019 and 2020 include, besides international development cooperations and the United States, the UK (EUR310 million, calculated 09.08.2022), EU institutions (EUR175 million, calculated 09.08.2022), Germany (EUR140 million, calculated 09.08.2022) and France (EUR124 million, calculated 09.08.2022) (OECD, n.d.-b). This engagement of the European countries underlines the importance of optimising the provided financial support.

3 Methods and approaches

To answer the research questions, a mixed-method approach was applied. Table 3 provides an overview of the methods used to answer each sub-question. The methods are further elaborated in the following.

Table 3 Overview of applied methods to sub-questions

Sub-Question	**Applied method**
1. What is the current state of sustainability in the plastic waste management sector in Nigeria?	• Literature review • Semi-structured interviews with Nigeria-based actors • System of Systems approach
2. What is Nigeria's political agenda regarding the sustainability transition, focused on the plastic waste management sector?	• Literature review • Semi-structured interviews with Nigeria-based actors
3. What is the role of Nigerian SMEs in the country's plastic waste management?	• Literature review • Semi-structured interviews with Nigeria-based actors
4. What challenges and opportunities do the SMEs face when receiving financial support from European actors?	• Literature review • Online questionnaire among Nigerian waste SMEs • Follow-up semi-structured interviews with SME employees

	• Semi-structured interviews with European investors subsequently to the online questionnaire
5. Which recommendations for European actors result from this regarding providing financial support to Nigerian SMEs active in the plastic waste management sector?	• Derived from analysing and discussing previous findings

3.1 Literature review

Existing literature was evaluated to map the research area of interest and find knowledge gaps on which the research questions were built. Afterwards, an integrative literature review based on Snyder (2019) was conducted to answer sub-questions 1 to 5. This included academic and governmental publications, organisational records as well as articles in newspapers and magazines. Thereby, perspectives from different research fields, such as sustainability, development and business studies as well as systems thinking were combined (Snyder, 2019). Literature was retrieved online using the search engines Google Scholar, Web of Science and WorldCat. The long list of search terms is available with the author. Publications written in English were of main interest, but German and Dutch texts were also considered. Relevant articles were identified based on their title and scanning the abstract (Xiao & Watson, 2019).

To answer **sub-question 1**, academic literature on processes and actors in Nigeria's plastic waste management was examined. To address data shortages regarding Nigeria, press releases, blog posts and governmental publications were consulted. This aimed to identify technological, social, environmental, economic, legal and political factors relevant to Nigeria's plastic waste management sector.

Sub-question 2 and **3** were answered by reviewing academic literature, organisational publications as well as national and international government documents to provide an overview of the sustainability goals for plastic waste management in Nigeria and the role of SMEs in the transition of the sector. The review was focused on national strategies and international guidelines relevant to the region and the sector.

To answer **sub-question 4**, a review was conducted of studies on and organisational records of SMEs active in Nigeria's plastic waste management. The findings subsequently informed the development of the online questionnaire and interview guide for the following interviews.

Sub-question 5 was informed by reviewing publications of European donor actors such as the EU, OECD and UN, GIZ, AFD, academic literature and reports from other private organisations. This was discuss the previously find results what subsequently informed the recommendations for designing investment instruments for European investors.

3.2 Semi-structured interviews

Semi-structured interviews were conducted following the approach of Adams (2015) to allow the uncovering of unforeseen aspects of, first, the sustainability of Nigeria's plastic waste management and, second, evaluating the so far underexplored financial support provided by European actors to SMEs.

Potential interviewees crucial to answer **sub-questions 1 to 3** were identified by searching online via Google for individuals and organisations that engage in Nigeria's plastic waste management. Additionally, authors of publications retrieved during the literature search were contacted. Further contacts were provided by Trinomics B.V. and the ACEN Foundation. This targeted politicians, academics, investors, and individuals from NGOs and businesses. Moreover, snowball sampling was used (Naderifar et al., 2017). This aimed to reach actors that are less present in online fora and, thus, difficult to identify without having personal contacts. Collecting their insights intended to complement the picture of the Nigerian waste management sector through local knowledge. Thereby, it added to the desk literature research which was conducted from the Netherlands and, thus, on its own may have been subject to biases. Potential interviewees were contacted in April and May. The invitation email is included in Annex A.1: Draft – Invitation for actor interview.

To answer **sub-question 4**, first, SMEs in Nigeria's plastic waste management were identified via online research. Google was used as the starting point for searching for plastic waste businesses in Nigeria. Identified companies were searched via Google to find company websites and profiles on LinkedIn, Crunchbase and NG-Check.com to assess the number of employees as the eligibility criterion for SMEs and identify contact details. Additionally, LinkedIn was used to discover similar companies. Personal email addresses were preferred but contact formulas and general email addresses of the company were also used. Furthermore, potential interviewees were derived from the participants of the online questionnaire (see 3.3 Online questionnaire). Participants could give their approval to be contacted for follow-up interviews at the end of the survey. Because some participants indicated to be willing to participate in the interviews but did not provide contact details, an email was sent, asking for the participants to contact the author in case they want to participate in the follow-up interviews. Second, European investors active in Nigeria were identified by Google research, LinkedIn and snowball sampling. Contact persons of investment facilities were identified by scanning websites and reading press releases.

Potential interviewees were contacted via email, LinkedIn, Facebook or Instagram. When asking for their participation, a short introduction about the topic and the relevance of the person's potential contribution to the research was provided. The respective invitation drafts are included in Annex C: Email contact to Interviewees (After questionnaire). In total, 16 persons were interviewed in 14 interviews. One interview included two business partners, one interview was held with three colleagues simultaneously and one interviewee was consulted twice. Two people provided written feedback. Interviewees were guaranteed anonymity of their data at the beginning of each interview.

Interviewees 1 to 5 were consulted prior to the online questionnaire to complement and validate the findings from the literature review to answer sub-question 1 to 3 and inform the design of the questionnaire. Interviewees 6 to 10 were investors, working for European organisations providing financial support to Nigerian SMEs. Interviewees 11 to 14 were employees of Nigerian waste SMEs. If the latter interviewees participated in the online questionnaire, the interviews were based on the results. Including actors from both sides of the financial support intended to gain a broader overview of the challenges and opportunities for the SMEs and to identify possible gaps in the perception of both actors involved. Interviewees 16 to 18 were working for one large and one micro-sized enterprise in Nigeria's waste management and a Federal government agency. The findings derived from their interviews were used to validate the findings for SMEs and check for generalisability. Details on the interviewees are given in Table 4.

Table 4 Detailed overview of interviewees

Interviewee #	Date of interview	Role	Location	Detailed job description (anonymised)
1	03.05.2022	NGO	Nigeria	Coordinator for West Africa at an international NGO promoting circular economy
2	03.05.2022	Consultant	Nigeria	Executive Director at a consultancy for Environment and labour rights; Board member of an international NGO promoting circular economy in Nigeria
3	05.05.2022	Researcher	Nigeria	Research Team Lead for a consultancy for international companies in Nigeria; Investigated the maturity of circular economy in Nigeria
4	14.05.2022	Development bank	Nigeria	Expert for climate change and green growth; engaged in establishing the Nigerian Circular Economy Working Group
5	17.05.2022 & 23.05.2022	SME	Nigeria	Entrepreneur of a waste treatment SME in Nigeria

6	30.06.2022	Investor (Europe)	Nigeria	Financial inclusion advisor at a European international cooperation organisation
7	30.06.2022	Investor (Europe)	Nigeria	Programme coordinator at a European international cooperation organisation
8	30.06.2022	Investor (Europe)	Nigeria	Advisor on local economic development, value chains and access to finance at a European international cooperation organisation
9	06.07.2022	Investor (Europe)	Europe	Coordinator of an Innovation Fund of a European government
10	12.07.2022	Intermediary	Nigeria	Programme Officer at an NGO for a European government fund
11	05.07.2022	SME	Nigeria	Co-founder of a waste management and recycling company; Received financial support from a European government
12	13.07.2022	SME	Nigeria	Managing director and CEO of a recycling enterprise; Received financial support from a European company
13	14.07.2022	SME	Nigeria	Entrepreneur of a waste recycling social enterprise; Received financial support from a European company
14	18.07.2022	SME	Nigeria	Founder and Team Lead of a recycling enterprise; Never received financial support from European actors
15	10.08.2022	SME	Nigeria	CEO of a waste management company
16	12.07.2022	Large company	Europe	CEO of a waste management company
17	13.07.2022	MSME	Nigeria	Founder of a waste management company
18	30.06.2022	Government	Nigeria	Ministry Director

All interviews were conducted online via Microsoft Teams or Zoom and took about 60 minutes. All interviewees gave their permission to record the meeting. The records were transcribed using the premium service of otter.ai. The transcriptions are available with the author. Afterwards, manual, inductive coding was applied. The findings were structured in a hierarchical coding frame to identify similarities and differences in the answers provided (Medelyan, 2019).

All interviews were based on semi-structured interview guides, tailored to the interviewee's background and adjusted to findings along the research in an iterative process (Hennink et al., 2020). The guideline included open questions accompanied by probes to collect in-depth information from different angles on the topic of interest (Kallio et al., 2016). The basic guides for sub-questions 1 to 3

and 4 can be found in Annex D: Interview guidelines. The interviews started with two opening questions to ease into the topic and establish rapport with the interviewees. This was followed by about eight main questions elaborating on the Interviewee's experiences related to the waste sector or the challenges and opportunities for SMEs when receiving financial support from European actors. A closing question eased out of the topic. At the end of each interview, the participant was asked if they want to add something or have questions for the interviewer.

In some cases, when the interviewee was based in Nigeria, the internet connection was too bad for a fluent interview. Then, the remaining questions of the guideline were provided to the Interviewee in written form via MS Word with the request to fill in the answers and send it back to the researcher. Additionally, written questionnaires were sent to interviewees with which a verbal interview was not manageable because of too busy schedules. An example can be found in Annex D.4 Written Interview (SME, After online questionnaire). One of the interviewees wanted to review its input before the publication of the report. The report was provided to the interviewee with its input being highlighted for review. The text was edited where needed.

3.3 Online questionnaire

To answer **sub-question 4**, an online questionnaire was used. This method was chosen to overcome timely and spatial restrictions, reduce costs of data collection and increase the willingness of informal business owners to participate (Van Selm & Jankowski, 2006). It is a flexible method allowing participants to answer the questions at a time convenient for them. Furthermore, it allows the inclusion of a larger number of participants (Verschuren & Doorewaard, 2010).

Potential participants were identified via online research, as explained for the SMEs above (see 3.2 Semi-structured interviews) and snowball sampling from previous interviews. The questionnaire targeted Nigerian business owners or employees with influence on the management of business operations. The exclusive criterion was the headcount of the SME, which was asked for at the beginning of the survey. If the headcount was less than 10 or more than 249, the participant was forwarded to the end page and thus not eligible to answer the questionnaire.

Potential participants were contacted via email on 09.06.2022 and 10.06.2022. This included the link to the survey and the request to forward the link to other potential participants. If additional potential participants were identified along the research process, invitations to the survey were sent out until 24.06.2022. Reminders were sent on 20.06.2022 and 24.06.2022. Furthermore, networks were identified and contacted by emails including the request for forwarding the survey link. The emails can be found in Annex B: Email contact to questionnaire participants.

The questionnaire was conducted via the online tool MarketCheck.com. The starting page gave information on the purpose of the questionnaire and intention of the research. Additionally, it provided the researcher's contact details in case of questions. The questionnaire started with an introduction including questions on the company's location, the participants' position and the company size. The latter constituted the only mandatory question to answer, to allow the screening of the sample (Van Selm & Jankowski, 2006). The main part was based on three branches, tailored to the participants' answers. The first targeted SMEs that have already received financial support from a European actor. The second was for SMEs that have never received financial support from European actors but did apply for it. The third one was for SMEs that neither have ever received financial support from European actors nor applied for it. The questionnaire used closed-ended questions including binary answers, Likert scales, and lists of options with multiple answer possibilities. Open questions were used to cover the participants' further ideas and opinions. Each Likert scale included one reverse question to check if the participants answered consciously (Weijters et al., 2013). The third part of the questionnaire, asked to all participants, included questions on the SME's financial information and status of registration as well as the permission for being contacted for a follow-up interview. The latter aimed to find participants for the semi-structured interviews. The questionnaire can be found in Annex E: Online Questionnaire.

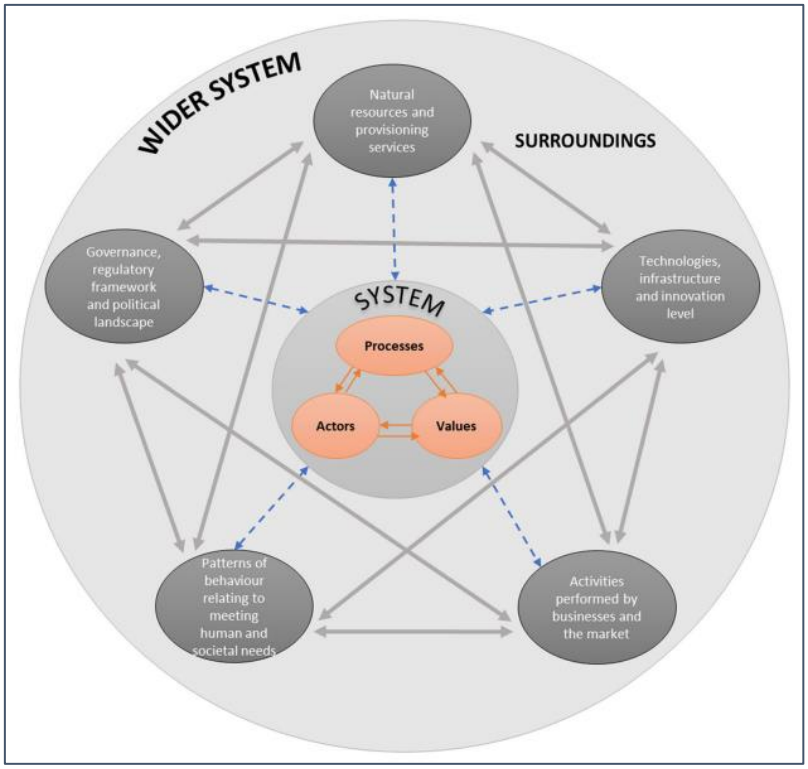
For data analysis, incomplete questionnaires were excluded. The considered respondents must have had a headcount between 10 and 250. Because of the low sample size, no statistical tests were run. Instead, the results were qualitatively analysed and used as a first impression of the topic and as informative input into the design of the follow-up interviews.

3.4 System of Systems approach

The system of systems (SoS) approach was applied to guide the data collection for **sub-question 1,** aiming to identify who and what shapes the landscape of plastic waste management in Nigeria. This conceptual approach was introduced by Iacovidou et al. (2021) to assess how resource recovery systems operate to promote transformational change towards a circular economy. According to Meadows (2008), a system consists of multiple elements, interconnections and a function aiming to achieve a goal. A system can respond and adapt to events, seek goals, be self-organising and, to some extent, resilient and evolutionary. According to Jati and Ardi (2020), the plastic waste management sector constitutes a system because it covers various stakeholders that interact with each other, aiming at proper plastic waste management. In this study, the system's boundaries are set on plastic in Nigeria and its management after being considered as waste. This does not exclude, for example, international actors as long as they impact plastic waste management in Nigeria.

SoS supports the description of systems that consist of independent sub-systems interacting via synergies to achieve a common goal. These interactions build the landscape of the main system, as illustrated in Figure 1.

Figure 1 Sub-system structure of a resource recovery system (Iacovidou et al., 2021, p. 24792)



Iacovidou et al. (2021) found any resource recovery system to consist of the three core systems processes, actors and values of plastic waste management. 'Processes' covers the whole life cycle of plastics because apparent flows and transformations result from the interactions across production, consumption and post-use management. Thus, inputs, outputs, stocks and leakages should be included in the analysis (Iacovidou et al., 2021). 'Actors' are directly and indirectly involved stakeholders, such as retailers, the waste management industry, NGOs and governments. 'Values' represent the institutional setting, including the environmental, economic, social and technical aspects. Each core system does not affect the sector on its own. Instead, they are interconnected and interact with the overall characteristics of the system. (Iacovidou et al., 2021). For example, a specific perception of the concept of waste becomes relevant for disposing of if involved actors apply it to plastic flows.

Additional to the core systems, five external sub-systems shape the landscape of a resource recovery system. These have a causal influence on each other's development and indirectly affect the core system. The sub-system 'Natural resources and provisioning services' covers ecosystems impacted by the production, consumption and management of plastics and the provision of services that favour the sustainability transition. It illustrates the influence on the environment and human health. To assess this, physical plastic waste flows and their ability for circularity must be defined. The second sub-

system ‘Technologies, infrastructure and innovation level’ includes the technological and infrastructure elements integral to plastic waste management. Those important for promoting the sustainability transition will also be involved. Sub-system 3 ‘Activities performed by businesses and the market’ refers to organisational relations causing and driving resource flows to meet human and societal needs. This provides insights into how and which economic incentives, market stability and information flows impact business activities in plastic waste management. The fourth sub-system ‘Patterns of behaviour relating to meeting human and societal needs’ describes apparent consumption behaviour and lifestyle choices as well as society’s ability to change these. Lastly, ‘Governance, regulatory framework and political landscape’ means political aspects underlying the socio- and techno-economic aspects of plastic waste management in Nigeria. These include existing resource and waste management policies as well as important stakeholders in decision-making processes (Iacovidou et al., 2021). All these interconnected systems are setting the scene for the sustainability of the plastic waste management and impact the role of the SMEs in this. Thus, the following chapter uncovers characteristics of the system and thus enables the contextualisation of the research.

4 The plastic waste management sector in Nigeria

Nigeria’s plastic waste management is a complex system that needs assessments on multiple levels to be understood. The following chapter does not describe every system on its own but illustrates their interplays along the plastic waste value chain, in the policy and institutional framework it is located in, also uncovering key actors, as well as regarding financial flows. This led to the identification of several service regimes and their interplay on the sectoral level.

4.1 The plastic waste value chain

The plastic waste value chain starts at that point when plastic products were perceived as waste. After being collected and separated, treatment strategies were decisive if the product reached its end-of-life or if the value could be kept.

4.1.1 Waste production

Plastic waste in Nigeria results from domestic waste production and imports. Precise figures on both aspects are lacking and existing ones predominantly cover urban areas, especially Lagos and Abuja. However, it can be assumed that about 12.7 million tonnes of plastic waste are generated in Nigeria per year.[1] This value alone makes Nigeria one of the largest plastic waste producers in Africa (Ritchie

[1] Babayemi and Dauda (2009) estimate that the average Nigerian produced 0.58 kg of solid waste/day in 2003. Assuming this total amount and a population of 206 million people as measured in 2020 (World Bank Group, 2022), nearly 120,000 tonnes of solid waste/day are produced in Nigeria in 2020. This assumption is reasonable comparing it with other average rates of urban waste generation, like 0.634 kg/capita/day produced in Abuja

& Roser, 2018). The most common plastic waste types in Nigeria are Polyethylene Terephthalate (PET), High-Density Polyethylene (HDPE), Low-Density Polyethylene (LDPE), Polyvinyl Chloride (PVC), Polypropylene (PP) and Polystyrene (PS) (RVO, 2020). They mainly come from single-use short-life products, like sachet water[2] and shopping bags. This is because:

> "*In Nigeria, it's cheaper to buy water that is packaged in sachet form, as opposed to PET bottles. So right now, I think the cost of one sachet package is about 20 Naira [EUR0.05]. And the cost for PET-packaged water is, I think, about 150 Naira [EUR0.35] if I'm not mistaken. And for the majority of the population, who do not have access to a lot of finance, it's cheaper to just use these sachet-package water*." (Interviewee 1, 03.05.2022)

This illustrates that this consumer behaviour is poverty-driven. On average, 70% of Nigerians consume one bag of sachet water daily during the dry season, resulting in 50 to 60 million used water sachets being daily thrown away (Edoga et al., 2008; Nwafor, 2021). Moreover, this packaging is becoming more popular to wrap household items, such as noodles, detergents, beverages and germicides (Duru et al., 2019). Thus, besides increasing accessibility to drinking water because of lower prices, its usage seems to be linked to convenience and habits. Nigerians consume plastic-wrapped things, like snacks and beverages, and dispose of the packages along their way on roads and highways. Most Nigerians consider plastics as waste with little or no economic value (Egun & Evbayiro, 2020; Gall et al., 2020). The mini polyethylene (PE) bags are used at food markets where nearly every item is sold in an individual not-reused bag (Duru et al., 2019). Additionally, the Covid-19 pandemic caused greater demand for single-use health products made from plastics, like gloves and face masks (Tiseo, 2021). This epitomises the linear consumption patterns prevalent in Nigeria's society.

4.1.2 Sorting and collection

Nigeria struggles with an ineffective waste collection system, inadequate technological capability and lacking separation, especially among households (Babayemi et al., 2018; Duru et al., 2019). For example, water bottles are separately collected at restaurants and ceremonies but not from

(Ogwueleka, 2013). This calculation might be conservative because it does not account for increases in consumption and waste production due to increasing wealth (Egun & Evbayiro, 2020; Kadafa, 2017). The World Bank assumes in its What a Waste report that out of Nigeria's municipal solid waste, plastics account for 18% (Hoornweg & Bhada-Tata, 2012). This would result in 21,600 tonnes of plastic waste/day generated in Nigeria and 7,884,000 tonnes/year. Jambeck et al. (2015) assumed a waste production of 0.79 kg/capita/day for 2010, out of which 13% account for plastics. Applying the current population size, a similar total amount of 7,722,013 tonnes plastic waste generated in Nigeria per year is calculated. Assuming an average production of 7.8 million tonnes plastic waste/year, combined with the finding of Egun and Evbayiro (2020) that the Nigerian per capita consumption of plastic has grown by about 5% annually over the past 10 years, results in 7.8 million tonnes * 1.05^10=12.71 million tonnes of plastic waste generated in Nigeria in 2020.

[2] Sachet water means pure water and describes drinkable water packed in nylon bags. The private sector started to offer sachet water to address the lacking access to drinking water among Nigerians. Today, it is one of the leading industries (United Nations Industrial Development Organization, 2021).

households (Babayemi et al., 2018). Another example is Abuja where municipal solid waste, including plastics, and hospital waste are collected separately but dumped together (Kadafa, 2017). Hence, most plastics end up as mixed waste on dump sites, complicating plastic-specific treatment (Babayemi et al., 2018). The efficiency of waste collection differs regionally with a gap between the coverage of urban and rural areas (RVO, 2020). In cities such as Abuja, the waste collection rate is found to be 45.1% (African Clean Cities Platform (ACCP), 2018). For rural areas, this number could not be found. On average 80 tonnes of mixed waste are monthly collected in Nigeria (RVO, 2020).

Waste collection is mostly organised by a small-scale and unstructured sector with a high contribution of informal actors (RVO, 2020). Numbers on employment are missing. In Abuja, about 2,000 people are involved in recycling activities, whereof more than 1,000 collect recyclables from the street and more than 600 recover recyclables in central disposal sites (United Nations Industrial Development Organization, 2021). In cities, waste from streets, households and businesses is formally collected by organisations from the local government, such as the Abuja Environment Protection Board (AEPB) or Lagos Waste Management Agency (LAWMA), or companies. The latter engage in areas dedicated to them by state agencies (RVO, 2020). Where the service provision is insufficient, private collectors do door-to-door collecting waste for a fee. The fee is no fixed value and could not be found. They often depend on outdated equipment, such as open and uncovered trucks that lose lightweight plastics on their way due to overloading (Duru et al., 2019). Additionally, formal and informal collection points or open dumps for solid waste develop, especially in urban residential areas (Kadafa, 2017). The formal collection points are usually regulated by local authorities or private businesses and should get cleared periodically (Interviewee 5, 17.05.2022). For example, AEPB provides those points outside of the main district for the waste collection from residential non-gated communities, offices and market areas. For gated communities, AEPB provides community bins in central areas and residents are responsible for bringing their waste there. Informal dumpsites arise due to both insufficient official collection and lacking knowledge of citizens about alternatives (Kadafa, 2017). The collection points get usually quickly overcrowded due to unregular and unknown cleansing schedules (Interviewee 1, 03.05.2022). Fobil et al. (2010) identified that Nigeria's waste management mainly serves the goal of cleansing, thus removing waste from areas of human activity to protect human health. Waste management of solid waste in favour of environmental protection is less important for urban dwellers. Eventually, collected waste is mostly accumulated in collection and sorting centres owned by waste collection companies (RVO, 2020). Sorting centers divide the plastic waste by type and colour, mostly manually. Afterwards, the waste gets cleaned to remove contamination and is passed to processors, sometimes over middlemen (Gall et al., 2020; United Nations Industrial Development Organization, 2021).

4.1.3 Treatment

Regarding the current state of circularity in Nigerian plastic waste management, Interviewee 3 describes that the waste goes "*right down to the landfill, straight, no processing- that is the problem we have at the moment. So, it is [...] a linear economy*." (Interviewee 3, 05.05.2022). This shows that the high total amount of plastic waste generated is accompanied by insufficient treatment methods. Nigeria has one of the highest rates of mismanaged plastic waste. About 80% is found to be mismanaged and thus disposed of at landfills or open dump sites, waterways, drains, streets and bushes (Babayemi et al., 2018). This accumulates to 1.9 million tonnes/year and accounts for 2.79% of the globally annual mismanaged plastics (Meijer et al., 2021).

The most common way of solid waste treatment in Nigeria is landfilling. In Lagos, for example, most landfill facilities are uncontrolled and do not meet international standards which could prevent the contamination of the environment. Instead, they are often former laterite excavation sites for road construction (Lagos Waste Management Authority (LAWMA), 2021). Because all kinds of solid waste end up there, plastics are rarely recovered, making it a linear instead a cyclic waste treatment method (Duru et al., 2019; Hopewell et al., 2009). To reduce the volume of existing waste and address the extensive plastic pollution due to missing alternatives, waste is often burnt during dry seasons, without any energy recovery (Duru et al., 2019; Egun & Evbayiro, 2020). Furthermore, Nigeria depends on the biodegradation of mismanaged plastic waste (Duru et al., 2019). This illustrates the prevalent inefficient and unsustainable processes, harming human health and the environment.

Recycling is currently seen as the most viable method for waste minimisation in Nigeria (Duru et al., 2019). The current capacity of recycling plants, mostly located in urban areas such as Lagos, Kano, Abuja, Aba and Onitsha, could cover 30% of Nigeria's recyclable waste (Duru et al., 2019). RVO (2020) found that 12% of the plastic waste produced in Lagos is recycled. This indicates either untransparent monitoring, the incapability to bring the plastic waste to the existing treatment facilities or a low demand for recycled plastics, resulting in low recycling shares.

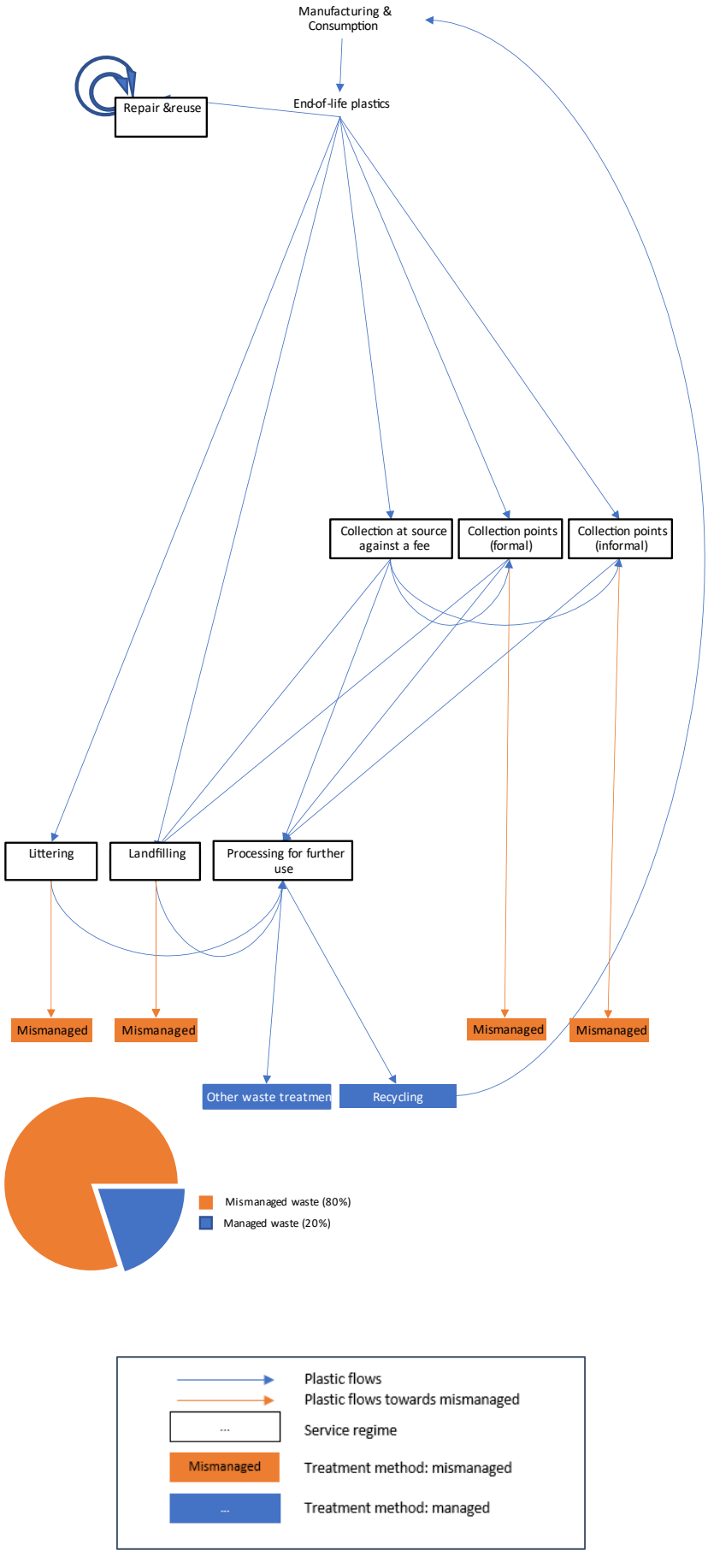
Nigeria's recycling plants preliminarily engage in secondary recycling, thus processing waste into products with different characteristics (Duru et al., 2019). The most recycled plastic is PET, sourced from furniture, reservoirs, bowls and buckets (Babayemi et al., 2018). It is recycled into chips, granules, flakes and pellets by companies such as Alkem Nigeria, Chanja Datti, Chidire Industries, Kaltani, Richbol and United Cyclers. The products are sold to companies like Engee PET or Indorama to be processed into recycled PET (rPET) resins. Recycling of the plastic types PP, HDPE and LDPE are less common but get recycled into granules, flakes and pellets by Alkem Nigeria, Chidire Industries, Omnik Limited, Richbol, for example (RVO, 2020). This shows that companies are often not specialised on the treatment of certain waste streams. Only one out of 12 recycling companies in Nigeria does chemical

recycling to produce liquid chemicals (United Nations Industrial Development Organization, 2021). Recycled plastics are reimplemented into production. Some Nigerian companies, such as Chidire Industries and Omnik Limited use the recycled materials themselves for manufacturing products like bottles, packaging, household utensils and others. Besides, recycled plastics are sold to manufacturers across industries, for example for Fast Moving Consumer Goods manufacturing, building materials and pharmaceuticals (RVO, 2020). UNIDO (2021) found nine out of 12 packaging producers use recycled plastics. However, they are concerned about the restricted usability of their products (i.e. for food contact products), limited sources of secondary material and difficulties in quality control. Producer not-using recycled materials considered product quality as the greatest risk. In general, Nigeria's recycling is limited by scarce technical recycling capacity and the risk of contamination of recycled plastics by hazardous substances (Babayemi et al., 2018).

Waste treatment strategies higher in the waste hierarchy are rarely covered by research. However, methods like repairing and reusing are inherent to the Nigerian culture. For example, hard plastic bottles are reused as containers for water, oil or nuts. These are prepared by waste pickers and mainly consumed by the low and middle-low-income classes. Besides being used for own storage, the bottles are filled with oil and sold (Interviewee 3, 05.05.2022; Interviewee 4, 14.05.2022). While this happens on a micro-scale, it must be considered that the Nigerian middle-lower and lower classes are relatively large. Thus, this is likely to result in a big market (Interviewee 3, 05.05.2022). Furthermore, bigger companies began to redesign their products. For example, SPRITE replaced its green-coloured bottles with transparent ones to enable domestic recycling (Interviewee 3, 06.05.2022). However, four out of five plastic manufacturers in Nigeria have never considered using alternative raw materials for production. Related perceived challenges are the increasing costs for raw materials, the non-availability of trained staff and inappropriate machines due to missing technology. Moreover, companies worry about the non-availability of raw materials and technology, lacking experience, high costs and probable negative customer reactions (United Nations Industrial Development Organization, 2021). The concept of sharing and renting is uncommon in Nigeria's waste sector. This is especially caused by lacking trust regarding repayments. A repairing culture is however widespread, as long as it is cheaper than a new purchase (Interviewee 5, 17.05.2022).

Nigeria's plastics follow linear consumption processes resulting in being lost after reaching the end of life. High-ranking treatment methods are inherent to Nigeria's culture, mostly driven by necessity. Recycling becomes increasingly important, however facing underdeveloped collection, sorting and treatment structures. The value chain is illustrated in Figure 2. Thereby, the thickness of the arrows is not adapted to the absolute amount of plastic flows due to lack of data.

Figure 2 Flows of plastic waste along the value chain



4.2 Policy and institutional framework

Many stakeholders engage in the sector and, thereby, take on various roles, as explained in the following.

4.2.1 Government

Nigeria's government acknowledges the problem of plastic waste management and introduced a framework of national waste management (Rajput et al., 2020). Several national guidelines address waste management and are mostly accompanied by a dedicated budget (ACCP, 2019). The National Policy on Solid Waste Management (2018) demands greater sorting practices and recycling and considers plastics as one of the separate sectors. Additionally, it implements Extended Producer Responsibility (EPR) and wants to promote plastic waste as a resource (United Nations Industrial Development Organization, 2021). The latest plastic-related policy, the National Policy on Plastic Waste Management, was approved in October 2020, aiming at the introduction of a circular economy in the plastic sector. It introduces bans, for example on single-used plastic (SUP) bags and styrofoam and demands mandatory EPR schemes (e.g. United Nations Industrial Development Organization, 2021). Additionally, the importance of awareness creation on waste recycling at the individual and community level is central (FMEnv, 2020). However, it is still not transferred into law (e.g. United Nations Industrial Development Organization, 2021). Despite public commitments, efforts to address plastic pollution are below average compared to other African countries like Kenya, Rwanda, Uganda and Tanzania. For instance, Nigeria is one of the only countries that still allows plastic bags. Legislation on prohibition was designed but is still under discussion (Akindele, 2022).

Other regulations indirectly impact plastic consumption and its waste treatment. For example, the National Agency for Food and Drug Administration and Control adopted a policy in 2008 that forced all soft drink manufacturers to use plastic bottles, resulting in a broad replacement of refillable glass bottles with PET packaging (THISDAY, 2021). Among others, the policies relevant to Nigeria's plastic waste management introduce internationally applied instruments, like the Responsible Party Pays principle, which is similar to EPR (e.g. FMEnv (Department of climate change), 2020). Moreover, international agreements like the Basel Convention, the Montreal Protocol and the Climate Change Convention are adopted by Nigeria and thus guide its policy making (Bukani, 2019). Recently, Nigeria announced joining the Global Plastic Action Partnership (GPAP) of the World Economic Forum (WEF) to advance national efforts in fighting plastic pollution. GPAP committed to circular economy as a solution for addressing plastic pollution (Anyaogu & Ayodele, 2021).

The responsibility for the policy framework is hierarchical in Nigeria. On the national level, FMEnv is the government's executing body, with the department of Pollution Control, Solid Waste Management and Technology as the focal point for solid waste management (ACCP, 2019; United Nations Industrial

Development Organization, 2021). The federal government made some efforts, like community-based waste management projects or infrastructure development. For example, FMEnv wants to partner with stakeholders to develop an appropriate regulatory framework to guide plastic waste management. Thus, it launched, together with the African Development Bank (AfDB), the Nigeria Circular Economy Working Group (NCEWG). NCEWG constitutes an open platform for sharing ideas and information to overcome silo thinking. In this context, a Nigeria Circular Economy Programme 2021-2030 and a Nigeria Circular Economy Roadmap shall be developed. Those will address waste management but will also go beyond (AfDB, 2021). Although FMEnv announced that the programme is already launched, it cannot be found online.

The discrepancy between governmental announcements and their translation into practice is that the government stated that 26 plastic waste recycling plants are located today in 26 cities across Nigeria (Egun & Evbayiro, 2020). Their contracts were awarded by the federal government in 2009 and eight of these plants were handed over to the government in 2012 (Nwafor, 2021). However, an investigation supported by the MacArthur Foundation and the International Centre for Investigate Reporting (ICIR) reported that the facilities are deteriorating. As one problem, the authors mention that the state government was expected to establish appropriate infrastructure for the plants, including access to roads, water and electricity. In case of the plant in Osun State, this infrastructure was not provided and the government never operated the plant. In Ekiti State, the Ekiti State Waste Management Agency is operating the recycling plant but lacks budgetary allocation by the government, hindering its operation and replacement of machinery. For Lagos State, the authors state that the plastic recycling plant seems to be non-existing, even though it was told to be ready for commissioning in 2013 (Akinwale, 2018).

One reason for this failure could be caused by the country's constitution that dedicates responsibility for providing basic needs, including local waste management, to State and local governments (Nigeria Embassy Berlin, n.d.; United Nations Industrial Development Organization, 2021). The institutions must follow national rules but can implement their own body for environmental protection that can make related laws, applicable within the State or jurisdiction (United Nations Industrial Development Organization, 2021). The missing framework caused differences in the execution across jurisdictions. As in Lagos and Ogun, the actors can be engaged in waste management. However, the State governments' efficiency in improving waste management is also rather low and the most successful agencies managed to transport wastes from residential areas to designated dumpsites (Duru et al., 2019). Regarding interventions promoting circular economy in the plastic waste sector it was said:

> *"Recently, I've noticed in Lagos [...] that the State government has begun some advocacy work. So, you'd see in certain areas large billboards encouraging proper waste disposal, encouraging*

recycling of plastic waste and so on. At, I think, one of the largest landfills in Lagos State, Solous landfill, there's a big billboard at the feet of the entrance [...] that encourages recycling. And I've seen that as well and several other locations." (Interviewee 1, 03.05.2022)

This illustrates that the local governments, at least in Lagos, began to take responsibility and go beyond policy-making by transferring it to the public. It was further said that the government's seriousness regarding the waste sector's sustainability transition could be increased via, first, movements on the ground. Societal pressure can cause reactions from the government to secure re-elections. Second, the requirements of international actors can guide governmental behaviour. The government might adjust its political agenda to be able to access international investments (Interviewee 1, 03.05.2022).

Another explanation for the weak governmental framework is the country's oil-richness. According to Subramanian and Sala-i-Martin (2003), institutional quality is reduced when the country is rich in oil and minerals, combined with uncontrolled institutions. Additionally, Nigeria's institutional structure led to revenues not being allocated across the federal states and systemic theft of public funds. Moreover, human capital was only focused on serving the oil industry and the society's attitude shifted from a work-based to an entitlement culture (Okpanachi & Andrews, 2012)

To summarise, it can be said that, theoretically, a regulatory framework for proper plastic waste management is established. Thereby, the existing policies are mostly linked to environmental aspects, like climate change, and follow similar principles as the European one, for example promoting EPR and focusing on recycling. This arises the concern that the consideration of local context and particularly the needs of the Nigerian society is insufficient. Furthermore, the policies lack implementation. The federal government neither enforces policies nor provides the infrastructure needed for proper waste management. State and local governments are not able to fill this gap. Besides an organisational problem, the divergence between announcements from the government on all levels and its implementation illustrates a transparency problem in Nigeria's public sector.

4.2.2 Private enterprises

To address the shortcomings of political intervention, private actors adopted a major role in enabling waste management in Nigeria (Interviewee 3, 05.05.2022).

4.2.2.1 Multinational corporations

MNCs have been guiding the sector's development. They face international pressure and, thus, are driving forces in increasing the sector's applicability to international standards. Various MNCs operate in Nigeria, like DOW Chemicals, Nestle or Cocoa Cola, and often engage in waste management on their own initiative by providing funds to local waste collection and separation initiatives, such as Unilever Nigeria to Wecyclers (RVO, 2020). Other multinationals, like Indorama Ventures, are more directly

engaged because plastic production and its treatment are their core business (Caliendo, 2012). Coca-Cola and its foundation have been especially active in addressing Nigeria's plastic pollution (Wansi, 2022). Thus, its case is further elaborated in Box 1.

Box 1 Coca Cola as an exploratory multinational company engaging in Nigeria's plastic waste management

Coca Cola is a US-based multinational company founded in 1886. In 1951, the Nigerian Bottling Company Ltd was incorporated as a franchise to bottle and sell products of the Coca-Cola Company in Nigeria. Two years later, a bottling facility in Lagos State commenced the production of Coca-Cola. In 1978, the company introduced worldwide the usage of PET packaging, however, the first PET packaging in Nigeria was used in 2004 (Coca-Cola Nigeria, n.d.-a).

Coca-Cola acknowledges its contribution to global plastic pollution and states to have the vision of a world without waste by applying circular economy principles. In 2005, Coca-Cola Nigeria and Nigeria Bottling Company introduced the first recycling model for PET bottles in Nigeria. Together with Alkem, a local synthetic fibre manufacturer, they established PET collection and buy-back schemes and built the first PET collection and sorting centres in Nigeria (Coca-Cola Nigeria, n.d.-a). For this, the enterprises invested USD1.7 million in Alkem (Coca-Cola Nigeria, n.d.-b). The collected PET, independent of source or brand, was recycled into synthetic fibres to be used as raw materials in local industries. This collaboration went on for six years and has set the base for both Nigeria's bottle-to-fibre recycling activities and the engagement of businesses in recycling. The project allowed the collection of about 26,000 tonnes of PET bottles and supported communities, women in especial (THISDAY, 2021). Thereby, Coca Cola mostly does not own collection infrastructures, but supports local collection and recycling programmes (Premium Times, 2022). In 2009, Coca-Cola introduced PlantBottle PET for plastic bottles partially made from plant-based materials and fully recyclable. This contributes to its aim to recycle 100% of its plastic packaging by 2030 (Coca-Cola Nigeria, n.d.-a).

Coca-Cola Nigeria also engages with various stakeholders, such as RecyclePoints, to collect and recycle one bottle or can for each bottle they sell. Additionally, they initiated the industry partnership Food and Beverage Recycling Alliance (FBRA) to promote the recycling of packaging waste (Coca-Cola Nigeria, n.d.-b). Between 2019 and 2022, the company has funded Nigerian plastic waste recycling projects with nearly EUR3 million (USD3 million, calculated 17.8.2022). In January 2022, Coca Cola established a new sustainability platform 'Jamii' that will invest in youth economic empowerment as well as water and waste management (Wansi, 2022).

While MNCs pushed the organisation of plastic waste treatment, they are also the biggest contributors to plastic pollution. Their impact is reflected in the statement regarding the relevance of circular economy to Nigeria's plastic waste management sector:

> *"[There are] different categories of plastic waste that you'd see. Perhaps the greatest would be PET. Because you'd see with FMCGs [Fast Moving Consumer Goods], Coca Cola, Nestle,*

Unilever, Bottling Company, PepsiCo and so on, most of the products are [...] sold and marketed in PET. [...] Back when I was growing up, you would almost always see the glass bottles, but that has almost been completely phased out perhaps because of convenience and so on." (Interviewee 1, 03.05.2022)

Thus, MNCs' business activities have a huge impact on Nigeria. Their social engagement is similar to those of the oil companies investing in Corporate Social Responsibility (CSR) projects to buy back their licence to operate from the community, even though they leave their negative externalities unaddressed (Okpanachi & Andrews, 2012). Nonetheless, as stressed by RVO (2020), MNCs are often the largest waste producers, but also the most important buyers of recycled material. This becomes increasingly relevant, facing changing product requirements in Europe, for example, like the share of recycled materials. As such, their interventions in Nigeria's plastic waste management focus preliminarily on increasing plastic recycling.

4.2.2.2 Contracted businesses

Further business cases addressing the plastic problem frequently develop around such large players (RVO, 2020). State and regional governments promote collaboration with those companies that are directly involved in plastic waste management, to overcome their own inabilities (RVO, 2020). Those businesses can be engaged by the government via contracting, concession, franchise or open competition. Those are explained in Box 2.

Box 2 Characteristics of possible public-private partnership contracts (Ogu, 2000).

- Contracting means that a firm is awarded a contract for waste management by the government. Mostly, the municipality pays the company as agreed in a contract.
- Concessions are long-term contracts where the private enterprise builds and runs the waste management facilities.
- Franchise entails a contract between the enterprise and the government to manage waste in a specific part of the city. Thereby, costs are mostly covered by the customers, but the government might try to regulate prices.
- Open competition means that several companies get a license to operate and compete all over the city

The choice of the contracts and their success varies depending on regional differences in the institutional framework and local circumstances, like the neighbourhood covered or the quality of the local infrastructure. For example, Lagos applies a contracting approach whereas Benin uses franchises (Ogu, 2000). Formal contracts mostly cover companies with a certain capacity, conducting activities of

waste collection and processing. As such, the first material recovery facility in Nigeria was commissioned in 2015 by the West Africa ENRG Company (Egun & Evbayiro, 2020).

4..2.2.3 Small and medium-sized enterprises

Explaining the role of SMEs in Nigeria's plastic waste management, Interviewee 3 elaborates:

> "*[SMEs] come and get your garbage. We have more of those people than recycling and proper waste management. [...] So what they do is to gather, sort and then resell to those who are going to do the recycling. [...] Normally they are just into, let's say, the first stages. They can [...] crush the bottles, wash them, and then they sell the [...] pellets [...] semi-processed. [...] They don't have the full-scale recycling*" (Interviewee 3, 05.05.2022).

This underlines the presence of SMEs in lower-value chain activities. Often, SMEs cannot afford the cost-intensive equipment needed to engage higher in the value chain (Interviewee 3, 05.05.2022; Interviewee 4, 14.05.2022). Thus, despite them being funded, the number of SMEs conducting recycling activities is low (Interviewee 3, 05.05.2022). Instead, SMEs often serve as waste collection points and, thus, can build the bridge between informal waste picking and formalised processing companies.

A common business model for Nigerian waste SMEs is the collection of waste from micro-enterprises and individuals against either cash or useful objects, like food or household items. The waste pickers are mostly paid by weight with fees adjusted to the type of plastic. Exemplary fees for compensation for waste delivery can be seen in Figure 3. This illustrates the high value of PET bottles compared to other plastic types. The so-called Recycredits (RC PTS) can be exchanged against phone top-ups, bill payments, shopping vouchers or cash (Chanja Datti, 2022b). Another exemplary business case, the SME RecyclePoints, is elaborated in Box 3.

Figure 3 Overview of compensation for certain plastics provided by Chanja Datti. (QTY=Quantity) (Chanja Datti, 2022b)

Chanja Datti Recycredits™ earning chart

S/N	DESCRIPTION	CODE	QTY	RC PTS
1.	PET Plastic Bottles	PB	10	1
2.	Aluminium Cans	AC	10	1
3.	Water Sachets/Nylon Bags	WS	100	1
4.	Glass Bottles/Jars	GB	100	1
5.	Cartons & Cardboard	CC	100	1
6.	Old Newspapers, Textbooks	ON	50	1
7.	Old Tires	OT	10	1
8.	Laminate/Flexible pack	FP	50	1
9.	Tins	TI	30	1
10.	Deodorant Cans	DC	25	1
11.	Other Plastics: old chairs, bowls etc.	OP	20	1
12.	E-waste	EW	5	1

Please note:

*All Recycredits participants must supply the required quantity to earn points. Points can be earned cumulatively.

*Points are redeemable from accumulation of 500 points.

If you have any other waste, send us a description or a picture and we'll let you know if we can find a home for it and get some value for you.

Box 3 RecyclePoints as an exemplary business case of Nigerian SMEs in the waste sector

RecyclePoints is a Lagos-based social enterprise active in waste recycling. It was founded in 2015 by Chioma Ukonu and has 11-50 employees (Crunchbase Inc., 2022). RecyclePoints applies an incentive-based approach to collecting recyclable post-consumer materials, including water sachets, PET bottles, used beverage cans, glass bottles and old paper. It runs four initiatives, each tailored to a target group:

- For individuals, the collection happens via drop-off or door-to-door collection. Based on the number of pieces delivered, registered people are awarded points that can be used to purchase household items offered in an iRecycle store.
- Waste pickers can bring their collected materials to the closest hub and receive cash, based on the weight of recyclable material delivered. The money is transferred to a bank account that can be directly opened at the collection hub (RecyclePoints, 2021b).
- Corporations can either pay an enrolment fee to subscribe to the recycling programme or participate as a Core Partner to support RecyclePoints with logistics by providing equipment, such as vehicles and tricycles, or basic infrastructure and facilities, like collection hubs. Additionally, Core Partners can contribute to awareness campaigns in schools.
- Academic institutions constitute the fourth target group (RecyclePoints, 2021a).

Due to the initiatives, the plastic is directly collected and not mixed with other waste. Thus, it is free from contamination, benefitting the recycling process. After collection, the materials are processed in Collection and Sorting HUBs to be sold to manufacturing and recycling plants. Those use the sorted waste as raw materials for the production (RecyclePoints, 2021b).

RecyclePoints joined three funding rounds and received a total of EUR226,000 (USD230,000, calculated 17.08.2022). In their first year, the company received non-equity assistance from the Tony Elumelu Foundation, a Lagos-based NGO supporting entrepreneurship in Africa (The Tony Elumelu Foundation, 2022). Two years later, the company received about EUR202,000 (USD200,000, calculated 17.08.2022) from Chivas Venture in a pre-seed round (Chivas Brothers International Limited, n.d.-a). Chivas Ventures is a London-based venture capital firm, belonging to Chivas Regal and globally supporting social entrepreneurs (Chivas Brothers International Limited, n.d.-b). The latest funding round was a grant of nearly EUR30,000 (USD30,000, calculated 17.08.2022) provided by The MasterCard Foundation and Massachusetts Institute of Technology in 2018 (Crunchbase Inc., 2022). RecyclePoints collaborates with LAWMA in waste recycling and sanitation advocacy. Additionally, the company is supported by the Private Sector Health Alliance of Nigeria, the Nigerian Stock Exchange, Lagos State Employment Trust Fund, LEAP Africa, Lagos Business School, Google Nigeria, GEMS4, FCMB, Enterprise Development Centre of the Pan Atlantic University, Coca Cola, Cleanup Nigeria Project, Chellarams Plc, British American Tabacco, access, WestAfricaENRG, unionbank and thistle practice consulting (RecyclePoints, 2021b).

SMEs like Chanja Datti or Wecyclers follow similar business models (Chanja Datti, 2022a; Wecyclers, 2019). The services offered by the SMEs are rather not specialised. They engage in multiple aspects along the value chain, like collecting and sorting waste. Additionally, they are horizontally diverse and include various waste types from paper to glass to plastics. While diversification is generally not recommendable for SMEs, especially when the business is still in the young growth phase (Bachtiar, 2020), this might be needed in Nigeria to protect the SME against the constantly changing policy framework. Besides the actual waste management, SMEs develop new technologies to improve the offered services or advocate for improving waste management in society (Interviewee 5, 17.05.2022). Many SMEs run NGOs, also to be able to access grants from donors (Interviewee 5, 24.05.2022).

4.2.3 Other private actors and international organisations

Individuals and micro enterprises perform waste collection and separation activities, mostly in an informal manner. Waste collection is a common practice among Nigerians to earn an additional living, also among elite urban dwellers (RVO, 2020). It is rather incidentally that waste pickers contribute to waste management and a cleaner environment.[3]

Academical institutions investigate sustainable solutions. For instance, the Raw Materials Research and Development Council (RMRDC), a federal government agency, develops bioplastics together with the Youth Scientific association Uyo. Additionally, it researches on recycling of plastics for monitoring devices together with the Centre for Energy Research and Development and the Department of Industrial Chemistry of the First Technical University and on the conversion of PP waste into fuel and plastic waste for the construction industry in collaboration with ECOHAVEN Solutions and Ahmadu Bello University Zaria (United Nations Industrial Development Organization, 2021). However, academia's impact on practical implementation seems to be low.

NGOs like the Fair Plastic Alliance are organising clean-ups or awareness-raising activities. Another example is W.A.S.T.E. Africa which implemented the Cash4trash initiative and wants to expand to Bottles for Books, aiming at out-of-school children, and P10K initiatives, targeted at waste pickers. NGOs are often supported by MNCs such as the Coca-Cola Foundation (Obioha, 2020). Furthermore, their engagement is often linked to the promotion of circular economy, as done by the African Circular Economy Network (ACEN) Foundation, the business network Circular Economy Innovation Partnership (CEIP) or the innovation network Nigeran Climate Innovation Center (NCIC). Those are active in advocacy and run related social media campaigns (Interviewee 1, 03.05.2022).

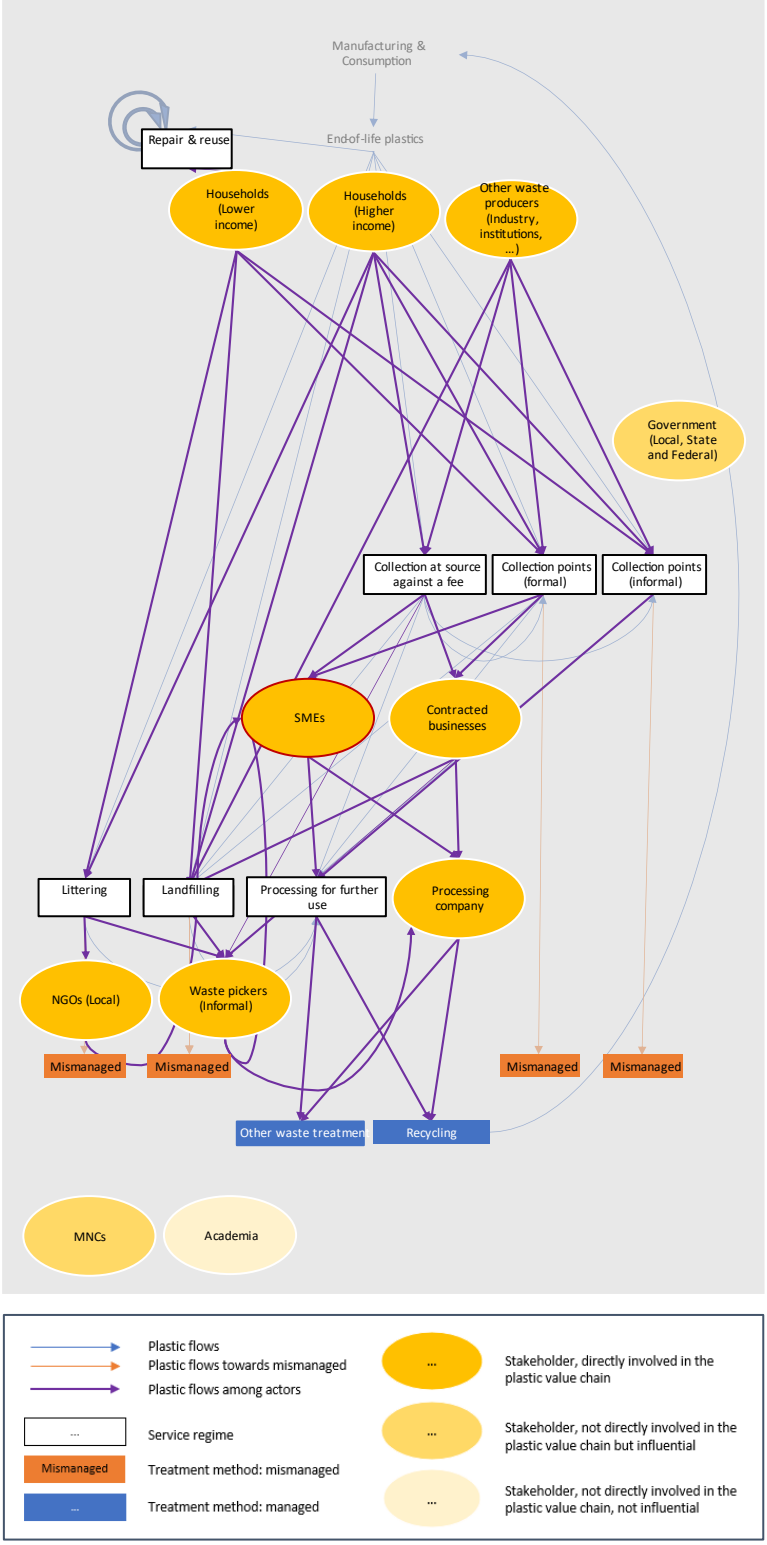
[3] Informal waste pickers are exhaustively covered in other research, which is why it is mentioned rather briefly in this research (e.g. Gall et al., 2020; Kadafa, 2017)

Further actors from the private sector are the Manufacturer Association of Nigeria, Organised Private Trade Sector (OPTS) and Service Industries and Construction Sector Groups (United Nations Industrial Development Organization, 2021). However, reliable data on their activities is scarce.

Global actors engage in Nigeria as well. For example, WEF participates via GPAP that wants to support governments, businesses and the private sector in implementing commitments to addressing plastic pollution. The World Bank engages via its PROBLUE programme and assesses GHG emissions and air pollution linked to plastics and mismanaged waste (PROBLUE, 2021).

Figure 4 provides an overview of the stakeholders in Nigeria's plastic waste management. Adding this second layer to the value chain demonstrates the role of the actor in the sector. For example, the government is not directly intervening in the material flows. SMEs, however, show multiple connections to mainly formal regimes.

Figure 4 Overview of stakeholders in Nigeria's plastic waste management sector and the plastic flows among them.



4.3 Financial framework

The main financial sources for waste management in Nigeria are revenues generated at the regional and State level, budgets allocated by the federal government and, increasingly, support from bi- and multilateral donors (Fobil et al., 2010). The commercial banking system is rather irrelevant, especially for SMEs (e.g., Interviewee 3, 05.05.2022; Interviewee 5, 17.05.2022). Bank loans to waste SMEs are

offered with interest rates higher than 25%, making it nearly impossible to pay back the loan. Additionally, the payback periods are rather short and the demanded collateral is too high. The latter is especially relevant to women entrepreneurs, as explained by Interviewee 5 when elaborating on challenges faced during upscaling its business:

> *"[...] the way it works in a place like Nigeria, which is very patriarchal, is that a lot of assets are inherited from father to son or through marriage. Typically, you share the assets with your husband. So, you buy assets in the name of Mr and Mrs."* (Interviewee 5, 17.05.2022)

Despite acknowledging improvements regarding this topic over the last years, this is considered a reason for women being unable to access finance and thus being stuck in businesses at micro enterprises-level (Interviewee 5, 17.05.2022).

4.3.1 Domestic financial sources

So far, the public sector's revenues account for the bulk of the financing, however, being insufficient for providing proper waste management structures. The implementation of proposed producers-pay-principles is challenged by poverty, barriers due to administration and implementation hurdles, scattered stakeholder consultation and lacking transparency. Simultaneously, cost recovery from customers is scarce. Taxes are rarely allocated and voluntary fees, for example for waste pickups, are uncommon (Fobil et al., 2010). The latter is reasonable in light of widespread poverty among Nigerians. Furthermore, the government's attempt to overcome the financial gap via public-private partnerships (PPPs) has frequently failed. Private businesses sometimes refused their contracts with the government because the government did not increase service charges despite increasing costs, for example for the maintenance of vehicles. Other hurdles are insufficient stakeholder engagement leading to unreasonable high fees, inappropriate infrastructure provision and unpredictable institutional changes (Ogu, 2000). Instead, businesses mostly rely on family and friends (Interviewee 5, 17.05.2022).

The activities of private businesses in plastic waste management indicate that it can be a revenue-bringing sector. The value is incorporated in plastics themselves. While end-of-life plastics are mostly considered economically worthless by customers, it is a viable resource, especially for the recycling sector and thus the waste pickers (Gall et al., 2020; RVO, 2020). PET is the most valuable material for recycling (Nwafor, 2021). This might be driven by the waste pickers often being paid by weight, decreasing the economical attractiveness of lighter materials. Additionally, the MNCs' demand for rPET might guide business activities. Dow, for example, launched projects to demonstrate the recyclability of other plastics, like nylon from sachet water bags (Dow, 2020). If successful, this could increase the economic value of plastics other than PET and thus its collection rate.

The revenue streams in the plastic waste sector are interlinked. Waste pickers collect waste either from dumpsites or households and streets. Scavengers in Lagos State can earn about EUR70-93/month (N30,000-40,000/month, calculated 17.08.2022) by selling sorted plastics and other recyclable materials (Oladipupo, 2020). UNIDO (2021) found that informal plastic waste collectors could even earn about EUR140/month (N60,000, calculated 17.08.2022). This is twice what the lowest paid employee of the Nigerian government would earn.

Finance for SMEs is especially challenging. SMEDAN (2021) identified that 59% of all MSMEs used personal savings as the most common source of capital. This is followed by 16.7% from family and friends and 15.4% from loans. Grants constitute the least, being used by 1.2% of MSMEs. PwC (2020) states that 15% of Nigeria's MSMEs used credit facilities as a source of finance in 2019. Other identified financing sources are trade credits (8%), cooperatives, grants and vendor financing (6% respectively), private equity funds (4%), venture capital (3%) and listing on the stock market (1%). This division, and the reliance on equity funds especially, seems to vary across company sizes since RVO (2020) found that 70% of 40 interviewed enterprises of all sizes in Nigeria financed and funded their operations via equity financing. The remaining 30% relied on finance institutions. Only a few used grants from donor organisations to start their business (PwC, 2020).

According to PwC (2020), 75% of SMEs started their business with a capital of less than EUR23,000 (N10 million, calculated 09.08.2022). Furthermore, the consultancy found that half of the surveyed MSMEs had applied for a bank loan in 2019 but refused it because of too high costs. Thereby, the height of the interest rate above 20% was the most restricting aspect. Additionally, loan applicants named insufficient collateral and guarantees as limiting factors. Those businesses having access to bank credits used mainly commercial banks (91.9%), 4.7% relied on microfinance institutions and 1% from development institutions (PwC, 2020). Large manufacturers in Nigeria provide grants through CSR initiatives or initiate projects by themselves. Next to funding and investments, multinational cooperation often happens via trade in waste and knowledge sharing (RVO, 2020). Additionally, SMEs receive small funds from international NGOs which are, however, mostly negligible. For example, Oxfam offered support to SMEs for purchasing equipment that covered about EUR17,000 of EUR355,000 needed (Interviewee 5, 23.05.2022).

Furthermore, After the government opened Nigeria for FDIs, foreign players were becoming increasingly interested in Nigeria's economy. The Japanese embassy in Nigeria and UNIDO signed an agreement with FMEnv for more than EUR2.7 million (USD2.8 million, calculated 09.08.2022) to support the government in implementing circular waste management (Karadima, 2022). The International Finance Cooperation (IFC) provided a EUR38 million (USD39 million loan, calculated 09.08.2022) to Engee PET manufacturing for the construction of a PET resin plant in Ogun State that

will take 20% of its needed raw materials from local plastic waste (Anyaogu & Ayodele, 2021). Thereby, most international investors in Nigeria's plastic industry come from India, China, Lebanon and Europe (Oladipupo, 2020).

The current financial framework cannot support appropriate waste management services in Nigeria. Public expenditure is nearly inexistent, thus, the private sector steps in as both a lender to other private actors and as a service provider creating a value chain for plastic waste. Furthermore, the sector gains attractiveness for international investments. While most external investments target infrastructure development, development aid often addresses entrepreneurs.

4.3.2 Finance from the EU and bilateral cooperations

One relevant agreement between the EU and Africa could be established by the Economic Partnership Agreement (EPA) between the EU and 16 West African States. The EPA with West Africa seeks to simplify goods and development cooperation by opening the markets among the trading partners. While sensitive goods, such as agricultural and specific final consumption goods are excluded from the EPA, it is likely to affect the trade with plastics, for example, via duty and quota-free trade. EPA introduces rules of origin, meaning that products can be exported to the EU duty-free when one production step was conducted in an EPA country. Thereby, the EU will open its markets from the day of the agreement, whereas West Africa would adapt its markets over 20 years. So far, Nigeria has not signed the agreement which is why it is not implemented yet (EC, n.d.-a). Currently, tariffs on importing plastics from Europe to Nigeria vary between 10 and 20% (EC, 2022a).

However, despite the EU being one of Nigeria's main trading partners and SSA playing a major role in the EU's external financial frameworks, no joint EU programme is established targeting Nigeria's waste management (EC, 2021a). Nevertheless, the EU addresses waste in its European Green Deal (EGD), considering plastics as one of the priority sectors. The EU enforced bans on exporting hazardous or difficult-to-recycle plastic waste from the EU to non-OECD countries in 2021 (EC, 2021b) and one revenue stream of the 2021-2027 EU budget is the plastic-own resource, demanding EUR0.80/kilogramme (kg) not recycled plastic waste from Member States (EC, n.d.-c). The potential impacts of those changes on the EU's trading partners are not explored yet, however likely to become visible in the future (Rajput et al., 2020). Moreover, the EU launched a Multiannual Indicative Programme (MIP) for Nigeria 2021-27 that focuses on green and digital economy; governance, peace and migration; as well as human development. This will spend EUR508 million to fund projects reinforcing bilateral cooperation (Delegation of the European Union to the Federal Republic of Nigeria and ECOWAS, 2021). Interventions in Nigeria will be coordinated with the NCEWG under a multiannual and multi-partner programme for a circular economy (EC, 2021a). The bilateral development cooperation portfolios are channelled, for example, by the United Kingdom (UK) by providing more

than EUR595 million (GBP500 million, calculated 18.08.2022) via its Blue Planet Fund to the Global Plastic Action Partnership (GPAP), which Nigeria's government announced to join in 2021 (Vanguard News Nigeria, 2021; World Economic Forum, 2021). Furthermore, the UK government plans to provide nearly EUR150 million for a waste-to-energy plant in Lagos State (Oji, 2021). Thus, the EU's financial intervention in Nigeria focuses on development cooperation at the State level and does not directly address the private sector (EC, n.d.-b).

Governmental agencies target the private sector more directly. For example, Deutschland.de, a communication service from the German Federal Office (AA), awarded a EUR15,000 grant to Vicfold Recyclers to support its upscaling. The Nigeran SME won the #youforG20 competition (deutschland.de, n.d.). The Netherlands engages in Nigeria via Orange Corners, for example. Orange Corners is managed by RVO and commissioned by the Dutch Ministry of Foreign Affairs. It launched the Orange Corners Innovation Fund (OCIF) in 2019, aiming to increase access to finance for startups that address the SDGs and local problems. Hence, it invested in Garbage In Value Put (GIVO) which is a tech company supporting other companies in adopting circular business practices and engaging in recycling (Government of the Netherlands, 2021). OCIF seeks to overcome the high-risk evaluation of startups when borrowing at traditional financial institutions. Therefore, they offer six-month programmes to entrepreneurs including a monthly allowance of EUR400 and a voucher of up to EUR3,000 for financing early-stage activities, like product development or market research. The three to five most promising business ideas are provided with additional startup capital of up to EUR50,000 each and TA for 18 months. The financing is linked to pre-defined key performance indicators (KPI) that must be met before qualifying for the next tranche of the fund. The money provided is partly a grant, partly a loan (Orange Corners, 2022).

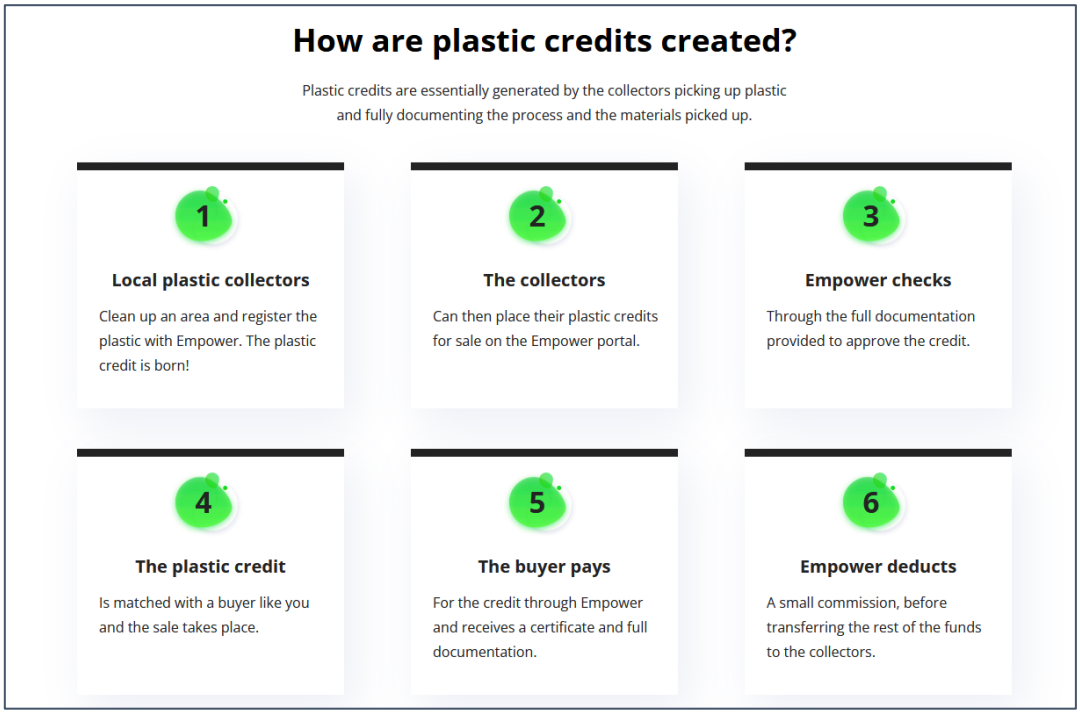
Generally, TA is common among European governmental interventions. For example, the German Ministry for Economic Cooperation and Development (BMZ) fosters knowledge exchange via supporting projects like the International Sustainability Academy (ISA) from the Schutzgemeinschaft Deutscher Wald Lv. Hamburg e.V. ISA promotes exchanges between Germany and emerging countries on the Development Assistance Committee (DAC) list, like Nigeria, in favour of the SDGs. In the context of an ISA scholarship, Nigerians came to Germany to visit local waste management strategies aiming to identify best practices applicable to Nigeria (Eckl, 2020). Generally, most German projects are linked to TA components, mainly addressing business literacy. The Center for Global Development (CGD) criticises that most of those TA projects target post-investment interventions and not the period of making projects bankable (Gavas & Pleeck, 2022).

4.3.3 Finance from other European actors

European **development banks** provide finance to Nigeria. The country received the highest investments from the European Investment Bank (EIB) in terms of international lending among African, Caribbean and Pacific countries. EIB has invested EUR296 million in Nigerian SMEs within the last 8 years (Dada, 2018). Recently, the EIB invested nearly EUR20 million in equity stakes in the Development Bank of Nigeria to strengthen lending to business and agriculture investment (AfDB, 2018). The German development bank, Kreditanstalt für Wiederaufbau (KfW), engages in Nigeria for more than 20 years by promoting economic development and employment opportunities, among others. The bank established a micro-finance institution for nearly EUR3.5 million in Nigeria. Thereby, the bank acknowledged that it would have been better to support already existing ones instead of implementing new ones (KfW, 2018). Additionally, KfW developed a green credit line that will start in 2022 and is managed by the Development Bank of Nigeria. This credit line aims to support MSMEs in purchasing energy-efficient machinery, for instance (KfW, n.d.).

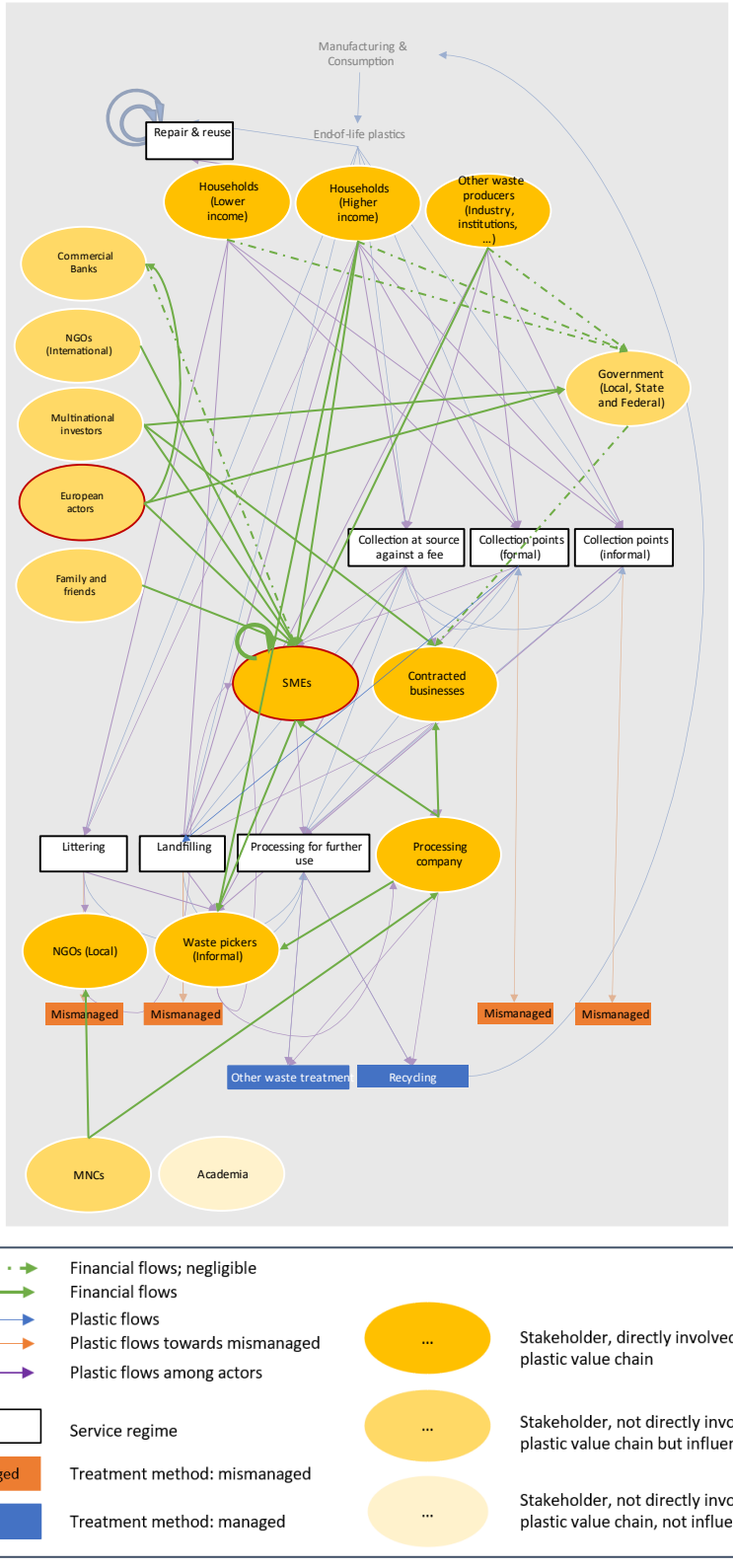
Private **businesses** also engage. Most of them have a social component, like Empower, a Norwegian for-profit startup that wants to promote the transparent and traceable collection, sorting and recycling of plastic waste worldwide by providing a digital platform. Empower provides plastic credits to plastic collectors, financed by other companies purchasing Plastic credits as part of Corporate Social Responsibility (CSR) activities, for example (empower, n.d.-a). The process is illustrated in Figure 5. In Nigeria, empower works together with DOW and anthophila, a Nigerian plastic recycling industry, for example (empower, n.d.-b).

Figure 5 Description of plastic credits (empower, n.d.-a)



The financial flows in the sector are illustrated in Figure 6. This third layer of the sector illustrates the capital flows that underly the SMEs' business models. It illustrates that the financial opportunities inherent to the sector are limited in number but cover the more circular waste streams. Furthermore, it illustrates the inexistence of financial flows from the government to SMEs. While the MNCs are involved in the sector when the financial layer is added, academic stakeholders are still excluded.

Figure 6 Financial flows between actors along the plastic value chain



5 Goals for the sector

Nigeria's policy-making is influenced by international agreements, protocols and conventions. At COP26 in 2021, Nigeria's president signed into law a climate bill saying that the country will reach net zero GHG emissions by 2060. This addresses Article 4.19 of the Paris Agreement, demanding the communication of long-term strategies (United Nations Framework Convention on Climate Change (UNFCCC), 2022). Hence, Nigeria's long-term vision states that "*By 2050, Nigeria is a country of low-carbon, climate-resilient, high-growth circular economy that reduces its current level of emissions by 50%, moving towards having net-zero emissions across all sectors of its development in a gender-responsive manner.*" (FMEnv (Department of climate change), 2021, p. 18). While waste is one of the main sectors in this long-term vision, plastics are only referred to as one contributor to air pollution when incinerated.

However, since plastics are part of solid waste, the goals also apply to plastic waste. As such, the long-term vision proposes circular approaches for GHG emission reduction in the sector, namely recycling, waste reduction, waste to wealth and energy recovery. A focus is thereby set on post-consumer urban waste. Hence, the waste sector's GHG emissions shall be reduced by at least 50% by 2050 and achieve carbon neutrality by 2100. Collaboration with stakeholders is not mentioned (FMEnv (Department of climate change), 2021).

Directly targeting waste, the National Policy on Solid Waste Management 2018 seeks to improve source separation and waste management infrastructure by promoting private sector investments in solid waste management. It pushes strategies high in the waste hierarchy and introduces a polluter-pays-principle, EPR and the precautionary principle. The National Policy on Plastic Waste Management, which is not passed into law yet, wants to reduce general plastic waste generation by 50% from 2020 to 2025 and thus applies a much shorter timeline than the country's long-term vision. Furthermore, it wants to ban plastic bags, cutlery and straws from January 2025 and phase out SUP and Styrofoam from December 2028. The law plans the implementation of a database on plastics and promotes alternatives to SUPs, like jute bags instead of plastic bags. Furthermore, it demands that plastic packaging must be recyclable or biodegradable or compostable and reusable by 2025. The policy introduces national and state-wide targets of a 65% recycling rate for municipal waste, 75% for packaging waste, reduced landfilling to a max of 10% of municipal waste treatment, 50% recycling of the total plastic waste and reduced use of plastic bags/cap to 50% by 2030. Additionally, mandatory EPR schemes, 5% deposit refund schemes for beverage containers and a 5% charge on SUP grocery bags are supposed to be introduced by 2021 (United Nations Industrial Development Organization, 2021).

The strategy to introduce this policy includes the consideration of the waste hierarchy and the shift from open to controlled dumpsites (FMEnv, 2020). This policy is expected to increase both the involvement of financial institutions already active in Nigerian recycling projects and the attractiveness to foreign investors (RVO, 2020). SRADev Nigeria found that the policy is missing the main aspects of the Basel Convention and, thus, does not cover international trade with plastic wastes and the related aspects of contamination and not environmentally sound disposal (Adogame, 2021).

Those regulations set the frame for State and local governments. These governments are supposed to align with the federal guidelines but can add regulations. For example, the Lagos State Plastic Waste Management Policy from 2021 aims at fully recyclable plastic packaging by 2030 and achieving about 50% plastic waste recovery by 2035 and 70% by 2050. Moreover, it aims at incorporating the informal sector into plastic waste management and better organising responsibilities of public, private and individual stakeholders (United Nations Industrial Development Organization, 2021).

Additionally, Nigeria's policies affect international trade with plastics. President Muhammadu Buhari applied so far a rather protectionist approach in favour of domestic producers, as reflected in not signing the EPA (The world factbook, 2022). Additionally, the Import (Prohibition) Act CAP 13 LFN from 2004 prohibits importing certain goods, such as PP materials, nylon tyres, fabrics, plastic bags, fishing nets and plastic cutlery (United Nations Industrial Development Organization, 2021). Having said that, it must be emphasised that interventions led by the government have been ineffective so far. The interventions' ambitions increase the more local the government is, but remain on a low level. This can be explained by the lack of democratic obligations of the government towards society, as typical for oil rentier states (Sandbakken, 2006).

Due to the insufficient implementation of governmental policies, external actors gain influential power in Nigeria's development. The plastic waste sector seemed to be impacted by the strategies of international trading partners. Multi-stakeholder platforms aim to promote collaboration beyond Nigeria. As such, GPAP demands a national Plastic Action Partnership in which the government connects various stakeholders to create a national roadmap with concrete steps for policy-making, business activities, awareness building and investments (Anyaogu & Ayodele, 2021). Such a roadmap is currently under development, coordinated by NCEWG. Strategic partners are the WEF, African Circular Economy Alliance, Islamic Development Bank, World Bank, UNDP, CEIP, ACEN as well as the EU and the Dutch Consulate in Lagos (AfDB, 2021). Nigeria's main bilateral trading partners are also likely to influence its value chains. The French Corporate Duty of Vigilance Law or the Dutch Child Labour Due Diligence Law require Europe-based companies to assess and address risks to human rights and environmental protection in their supply chains (Woolfrey & Karkare, 2021). Furthermore, the EU announced to try pushing developing countries towards more sustainable practices. Especially the EGD

promotes a climate-neutral economy and circular supply chains. The EU Circular Economy Action Plan (CEAP) is likely to cause a decrease in EU raw material imports for production in the longterm (Woolfrey & Karkare, 2021). To compensate for this decline, alternative products, like secondary materials could become more interesting to Nigeria. Furthermore, business activities higher in the value chain for domestic trade could become more important.

Besides politically incentivised influences, the private sector's ambitions become relevant. Coca-Cola, as one of the identified main drivers, directly addresses the plastic sector with its World Without Waste Vision. This aims at 100% recyclable consumer packaging, without specifying a timeline, and the collection and recycling of one bottle or can for every one sold by 2030. Thereby Coca-Cola relies on a multi-stakeholder approach (Coca-Cola Nigeria, n.d.). Indorama Ventures, one of the biggest chemical producers in Nigeria, committed to the New Plastic Economy. This aims at fully reusable, recyclable or compostable plastics. More concretely, the company wants to increase its global recycled content volumes by at least 750,000 tonnes by 2025 and invested nearly EUR1.5 billion (USD1.5 billion, calculated at 17.08.2022). A circular economy is thereby the approached solution (Indorama Ventures, 2019).

To summarize it can be said that plastic waste management is subject to increasing attention. Thereby, different actors have different goals for the sector. Political stakeholders focus on international agreements like the SDGs and the PA. While this includes all strategies high in the waste hierarchy, private businesses focus more on the acceleration of recycling.

6 The role of SMEs in the sector's sustainability transition

Although SMEs are rarely considered in Nigeria's policy making, they are seen as the backbone of Nigeria's economy (e.g. Karadima, 2022). The role of SMEs in Nigeria's plastic waste management was emphasised:

> "*In terms of circular economy, [SMEs] probably carry the most weight and [...] have the most impact, compared to larger corporations, in my opinion. Because they're the ones that are the driving force for the change. They're the ones that start recycling companies and so on. Nigeria, I don't think it's different from other African countries in terms of the role that SMEs play in waste management. [...] They're the ones driving the advocacy, they're the ones running the [sector]. They're the ones with the innovative ideas that are bringing change [...], trying to bring new technology, finding solutions. But in small scale.*" (Interviewee 1, 03.05.2022).

This stresses that SMEs are highly involved in the sector's transition and contribute to the country's goal of shifting towards a circular economy. Their innovative character is thereby especially

emphasised. On small scale, SMEs might be suitable to test and showcase solutions. However, those must be upscaled to eventually have a sustainable impact.

The innovative SMEs, often run by young entrepreneurs, might support the expectation of waste management becoming one of the most profitable sectors in Nigeria since they can improve the less effective methods currently used (Karadima, 2022). SMEs do the hands-on work, compared to larger businesses having a different business focus and the policy-making governmental actors. MNCs depend on collaborating with SMEs to enable waste collection and its transportation. To achieve their targets, MNCs should use the already implemented structures (Interviewee 5, 17.05.2022). Furthermore, some business models of SMEs contribute to the polluter-pay principle by charging a fee for waste pick-ups. They raise awareness among society regarding plastic pollution what can contribute to reduced waste production in the long term. The impact of SMEs on communities could be caused by their close connection, for example, due to engaging communities in clean-ups but also employing them. Additionally, this entails communication accessible to laymen (Interviewee 5, 17.05.2022). Furthermore, SMEs contribute to the formalisation of the sector. SMEs collaborate with mostly informal waste pickers because they depend on their workforce, supply with materials and experiences in the sector. Simultaneously, SMEs contribute to the waste pickers' rights by providing PPE, training and support in creating ID cards and bank accounts (Interviewee 5, 17.05.2022).

SMEs also have to cope with obstacles in the sector. The bans planned in the plastic waste policies might impact the work of SMEs. For example, expecting SUPs to be banned soon, SMEs might be hesitant to focus their business on this. If they want to stay broad, this might negatively impact their efficiency. Additionally, recycling is expensive and requires machinery, energy, labour, logistics and know-how. Hence, this part of processing is conducted by larger companies. Furthermore, SMEs highly depend on external financial support because of lacking investor confidence and access to money (Personal communication, 11.07.2022).

This illustrates that SMEs are interwoven with other actors and services in the waste sector. They carry the potential to foster transitions that would contribute to the goals set for Nigeria's plastic waste management. However, they face challenges that limit their potential to flourish. Especially, they depend on a stabilising policy framework and financial resources to scale up their business.

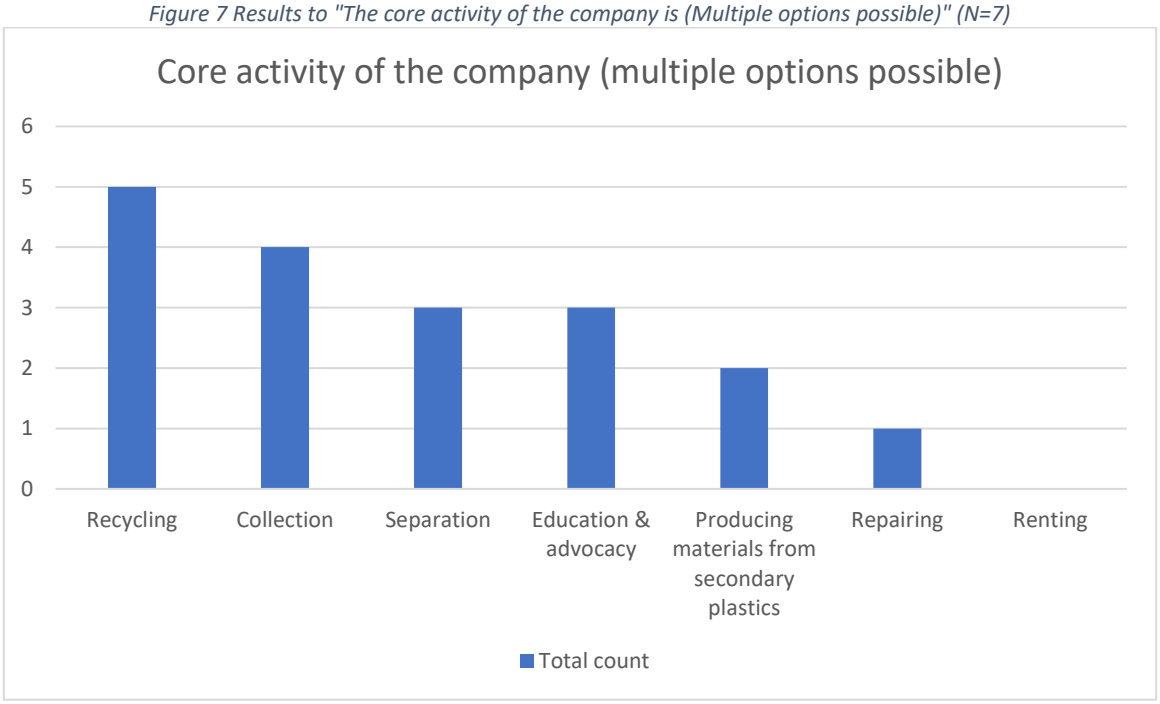
7 Results

7.1 Online questionnaire

The online survey had over 90 start page views, but eventually 13 people completed the survey. Six of those were enterprises with less than 10 employees and were thus not eligible to answer the questionnaire. Eventually, the results of seven respondents could be used for data analysis.

Of the respondents, 43% (*n*=3) worked for small enterprises. 57% (*n*=4) were medium-sized enterprises. In 2019, nearly all of them (*n*=6) had an average annual turnover and asset value of less than EUR 2.1 million (900 million Naira, calculated 17.08.2022). Furthermore, 86% (*n*=6) were registered at a governmental organisation, 71% (*n*=5) at a business platform. Nearly half of them (*n*=3) were part of a workers' association. None was unregistered. Moreover, four of the SMEs were located in the South West geo-political zone of Nigeria, one respectively in North Central, North West and South East. Three of the SMEs were established more than five years ago, two of them during Covid-19 (one in 2019 and one in 2020). 86% (*n*=6) have a male owner, one a female. One-third of the owners (*n*=2) are younger than 30 years old. Most SMEs engaged in recycling, collection and separation as well as education and advocacy. The activities are shown in Figure 7. Additional activities related to transportation, and "training youths in skill acquisition in using PET bottles as building material and using soft plastic materials in making interlocking tiles."

Figure 7 Results to "The core activity of the company is (Multiple options possible)" (N=7)



7.1.1 SMEs that have received funding from European donors (*n*=2)

One-third of the SMEs (*n*=2) had already received funding from a European donor, including one small and one medium-sized enterprise. The companies' characteristics are summarised in Table 5. The small enterprise received financial support from the British Council and the medium-sized enterprise a plastic credit funding from "Empower". Both payments came without payback requirements.

Table 5 Characteristics of respondents that have received financial support from a European actor

	Small enterprise	**Medium-sized enterprise**
Founded	2017	2019
Location	North West	South East
Gender of owner	Male	Male
Main Activities	Collection, separation and recycling	Collection, separation and recycling, education and advocacy
Financial support	Loan/Credit from the British government	Plastic credits from empower

The medium-sized enterprise's financial support was needed for "Daily business operations/keep the business running". The small enterprises predominantly needed financial support for starting the business. Both companies heard about the financial support via social media, the medium-sized enterprise additionally via friends and family. None of the respondents perceived challenges regarding the hard facts needed for an application for the financial support, like the age or gender of the owner. However, both struggled with business-related aspects, like developing a business and financial plan.

The payment from the British council came not as expected and, accordingly, did not enable long-term planning for business development. It further did not secure a stable income. Differently, the payments from Empower did come as expected and were also perceived as enabling long-term planning. Additionally, the latter demanded from the enterprise to start with bookkeeping

Although both respondents stated that the amount paid was insufficient to cover their needs, it effectively contributed to achieving the intended goal. The financial support enabled activities that would not have happened otherwise and they agreed that it was worth the effort of applying. Both respondents thought that the enterprise can continue its business in the long term after the financial support is exhausted.

7.1.2 SMEs that have never received funding from a European actor (*n*=5)

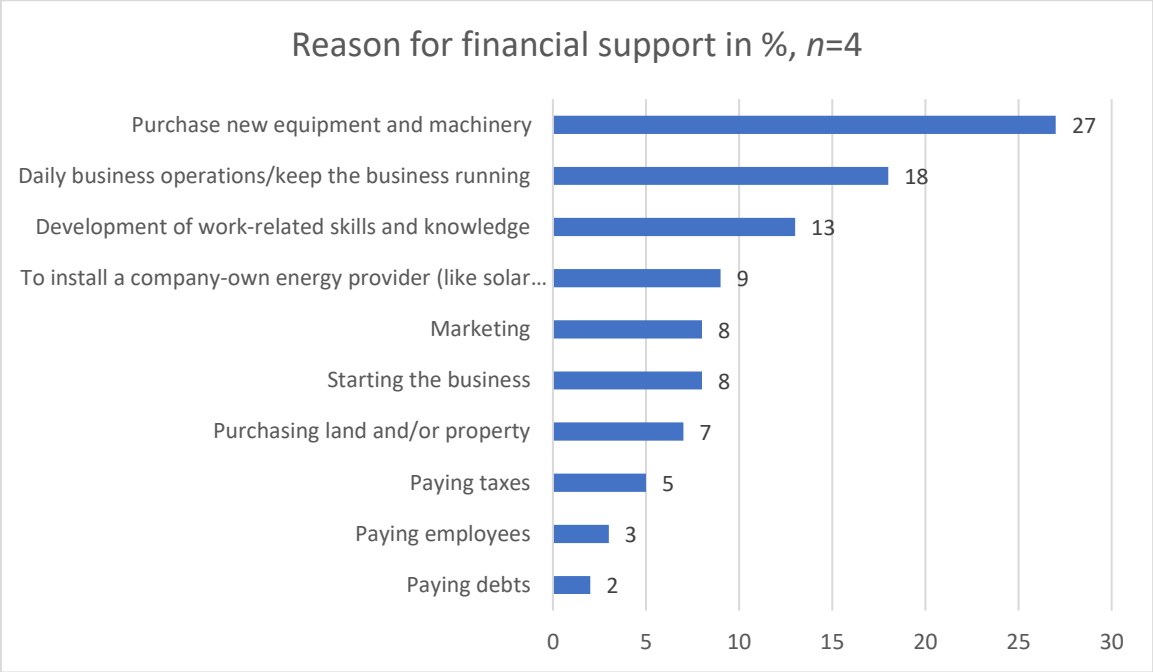
Five SMEs have never received funding from a European donor and never applied for it. 80% (*n*=4) of those would be interested in it. One company did not indicate a clear tendency. Interesting characteristics are summarised in Table 6.

Table 6 Characteristics of respondents that have never received financial support from a European actor

	Interested (*n*=4)	**Not sure (*n*=1)**
Size	2 small, 2 medium	medium
Founded	1968, 2010, 2017 2020	2017
Location	South West	North Central
Gender of owner	1 female, 3 male	male
Main Activities	Collection, separation, recycling	Recycling and education

All of the interested companies had financial needs which they did not expect to cover due to other financial sources. Thereby, the most urgent support was needed for purchasing new equipment and machinery (*n*=4). Liquidity for financial demands was less important, as illustrated in Figure 8.

Figure 8 Results to "For what reason does your company need financial support? Please rank the following options based on relevance with 1 being the most important aspect." (n=4)



50% (*n*=2) of the interested respondents, including the women-owned enterprise, never applied because they were not aware of the funding opportunities. One company knew about it but never considered it optional for its own company and one indicated not wanting to ask others for money. The latter also stated to not trust European donors. However, all expected their company to be eligible for the funding and able to deliver requirements linked to the support, like being registered, company size, business or financial plans or interest rates. Two companies stated that it would be irrelevant if the financial support would not meet the company's values or beliefs, the other two found this as not applicable.

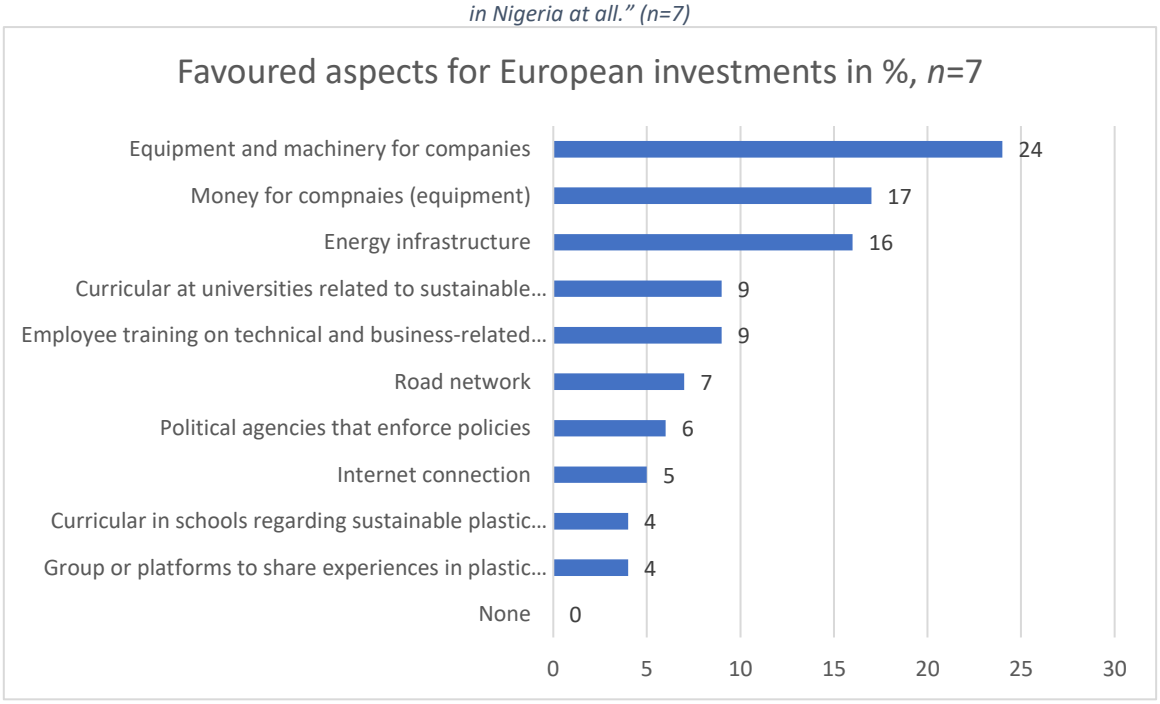
The undecided enterprise would also need financial support for business upscaling. However, the formal requirements and collaterals demanded by EU donors, a mismatch with the company's values and beliefs as well as mistrust in EU donors were reasons to not apply for EU support. Interest rate and payback period were however not relevant.

7.1.3 General insights (*N*=7)

Besides the European financial support, all respondents stated to rely on private financial sources for business activities, including private savings, friends and family as well as business revenues. Nigerian commercial banks were used for equipment purchases (*n*=2) and one of the countries that also received support from Europe used Crowdfunding for operational costs.

All respondents wanted European actors to invest in Nigeria. Besides business aspects, the respondents would like Europeans to invest in energy infrastructure and training for employees and at universities, as illustrated in Figure 9. Thereby it is uóutstanding, that groups for knowledge sharing rank 6 when considering only the SMEs that already received financial support.

Figure 9 Results to "In which aspects in Nigeria should European investors invest? Please rank the following topics according to their relevance, with 1 being the most important. Please place 'None' at the first place if you think they should not engage in Nigeria at all." (n=7)



Additionally, SMEs recommended that European actors should provide more grants targeting the public's education. Additionally, the usefulness of the financial support was expected to increase when it would be channelled via workers' associations or the Nigerian Chamber of Commerce. Lastly, it was emphasised that Europeans should put the SMEs' needs first and allow Nigeria to realise its own developed concepts.

7.2 Follow-up interviews

The following chapter elaborates on the challenges and opportunities of the SMEs regarding financial support from Europe by considering both sides the donor and recipient of financial support. The interviewed investors engage in funding programmes which cover waste companies but are not

specifically tailored to them. Thus, the findings derived must be seen as generally relevant to Nigerian SMEs. SMEs were found to face several challenges and opportunities which related to the accessibility of the support to SMEs, charactersitcs of the finnaical support itself and indirectly accompanying challenges and opportunities. Additionally, alternative financial instruments were investigated. While this chapter presents the synthesised findings, details on each opportunity and challenge are given in Annex F: Elaborate challenges and opportunities for SMEs.

7.2.1 Challenges

7.2.1.1 Accessibility for SMEs

The waste SMEs faced **limited availability** of European support programmes that are tailored to their needs. This intensified regarding monetary instruments. European actors predominantly offered TA on business-related, but not waste-related, aspects, seldomly linked to financial instalments. Additionally, all interviewees lacked an overview of programmes existing in Nigeria. The missing alignment of the current support mechanisms led to the inability to guarantee that a trained SME will receive financial support.

However, TA at least seemed to be effective in preparing entrepreneurs for the application. Most **application processes** demanded SMEs to concisely present themselves to investors. While aspects in which they achieve training were less difficult for them, pitching, especially in written form, was still burdensome and uncommon for entrepreneurs, creating a gap between them and the investors. This gap was also reflected in the entrepreneurs asking for higher monetary demands than needed because they thought it is their only chance to access finance. Additionally, SMEs were lacking guidance through the application process, including explanations for each task and an overview of the application's timeline.

The **eligibility criteria** linked to the financial support restrained SMEs' application because they were expected to be difficult to meet. This was related to potentially demanded credit checks which SMEs cannot provide. Moreover, one male entrepreneur found it challenging for male entrepreneurs to access development aid because the current programmes predominantly focus on the youth and women entrepreneurs (Interviewee 11, 05.07.2022). Besides gender and age-related restrictions, most programmes were offered only to Lagos-based enterprises. However, difficult eligibility criteria were mostly perceived before the literal application. Afterwards, they were rated as manageable. Nonetheless, both investors and SMEs emphasised the need for basing decision-making more on non-financial aspects, like the social challenge addressed, external business risks or the potential production capacities.

7.2.1.2 The financial support

One challenge all interviewees agreed on was the **size of the financial support**. Interviewee 13 (14.07.2022) described it as "*a trickle in the ocean*", compared to the amount of money SMEs need. Additionally, neither high one-time payments nor lower instalments over a longer period could secure the long-term survival of SMEs. While the latter provides income over a longer period, the possibilities to stretch the support period are limited. Smaller amounts of money would lose usefulness regarding purchasing power and the highly varying exchange rates for Naira and the high domestic inflation diminish the efficiency of multiple payments.

Furthermore, the size of the financial support is **sensitive to changes in the donor's source**. Reductions in the liquidity of the donor, for example, due to changing political interests in the donor country or an unstable size of payments due to the dependence on market forces trickle down to the SMEs. This negatively affected their business planning because the entrepreneur could not consider it for their budget and strategy planning. Thereby, the power relations are unequal since the SMEs cannot impact the donor, for example regarding the topic targeted by the financial support. This power imbalance was also reflected in the **inflexibility of the support programmes**. The agreements on the financial support could not be reassessed. Thus, SMEs could neither adapt the final expenditure goal nor the milestones along the way what was especially challenging facing the unstable Nigerian business context.

Additionally, SMEs struggled to keep their performance level after the financial support ended. While the entrepreneurs did not see that challenge, investors stated that not all SMEs that received grants could grow or even survive in the long term. Instead, some SMEs struggled to manage cash flows and keep liquidity afterwards. This negatively affected the organisation of payments, including salary and purchases from suppliers. While this could be caused by the unpredictable environment, including aspects like power shortages, SMEs were also unable to keep trained employees in the long term. Furthermore, SMEs could not maintain their previous positive contribution to society, for example additional fees on salaries for waste pickers, when having to survive in the real market (Interviewee 9, 06.07.2022, Interviewee 10, 12.07.2022). This indicates that SMEs were not enabled to self-sustain but **depended on the continuous payments of the European donor** and the financial support programmes failed to increase the accessibility of local follow-up funders and support facilities for SMEs.

Moreover, because some investors think that SMEs cannot handle large amounts of money yet, they channelled their support through **intermediaries** that are expected to forward benefits to the SMEs, for example by developing training programmes. However, this is highly critical considering the level of **corruption** in Nigeria. Interviewee 14 stressed that European actors should choose European intermediaries, like embassies located in Nigeria:

> "*And the issue, let me put it simply, is corruption. There might be the possibility when the EU is giving us USD100,000. And this agent, once it is not their own agent, is claiming [parts] out of that, forgetting that we are set to make impact. That is where the issue is. At the end of the day, [the agent] delivers maybe USD80,000 to us and forces us to sign that we collected all the USD100,000."* (Interviewee 14, 18.07.2022)

Thus, SMEs preferred international NGOs to channel investments, especially compared to domestic government agencies and local NGOs. Additional to the abstraction of money, favouritism and personal interests of local agencies could lead to funding being granted to people having the right connections instead of those who would merit it.

7.2.1.3 Accompanying challenges

As touched upon earlier, the effectiveness of the financial support is limited by high exchange rates for Naira. However, even though Nigerians can create bank accounts in the European **currency** and most entrepreneurs would prefer receiving financial support in USD or EUR, investors insisted on transferring the amount themselves and providing it in Naira. This was especially illogical considering that purchases, like equipment, are often imported and thus paid in a currency different to Naira.

Another challenge inherent to the waste sector was **delayed payments**. As a common payment method, SMEs depended on cash advances as a current domestic financial source, meaning that the buyer gives out Local Purchase Order (LPO) Finance[4] in cash. After completing the delivery, the SME receives the balance. However, those agreements are trust-based and the supplier must have successfully supplied the buyer before. This financial delay must be considered when designing investment instruments since it hampers the SMEs' capabilities to run operations.

Besides these financial issues, **data availability and verification** were challenging for both investors and SMEs. Investors preliminarily struggled with data availability. For example, SMEs were more likely to participate in the programme if they cover aspects of circular economy. However, no standardised means exist to measure the SMEs' impact on that. Instead, entrepreneurs had to point out those aspects in their business model themselves. Accordingly, outcome assessments were difficult. SMEs were troubled by prolonged verification processes because the donor did not have an office in Nigeria what made the data verification more complex and time-consuming. Furthermore, investors did not

[4] LPO is a funding agreement in which the buyer clarifies towards the seller the quantities of which products it wants to buy at which prices. Those material purchases can cause cash flow gaps in which the supplier does not have enough working capital available. LPO can overcome this gap by releasing money in advance. This can enable companies to accept orders for which the working capital would not sufficient. LPO is mostly rather short-term and a rather expensive financing facility. It is often provided via a specialised lender. The lender wants to collaborate with well-known organisations and demands information on the business and credit ratings. LPO is either paid directly to the supplier or provided to the buyer who can pay the balance itself. The money lent is subject to interest (SukFin, 2022).

have standardised approaches regarding the data they demand from SMEs. Depending on the financial facility, facts like the address of a company or demand photos of purchased machinery were checked.

Furthermore, **religion-related aspects** could hamper the entrepreneurs' willingness to apply for European finance. For example, Islamic investments are not allowed to include interest. Most investors did not consider those aspects yet, although it can result in unaccessible financial support for some SMEs if the values and beliefs of the entrepreneur are not met.

Less explicit challenges arose from **cultural differences**. First, entrepreneurs perceived the motivation of European actors as not being focused enough on the social and environmental impact of their investments. They emphasised that the decision-making should be based on those impacts. Second, they wanted Europeans to consider the nature of the Nigerian sector and acknowledge the inherent differences to the European waste sector. Nonetheless, they encouraged Europeans to take on more risks and invest in the emerging sector. In this regard, it was also emphasised that Indian and Chinese stakeholders will dominate the sector if Europeans do not step in now (Interviewee 13, 14.07.2022). Contradictory, investors saw a challenge in the "*risk-averse*" Nigerian business attitude (Interviewee 9, 06.07.2022). For example, parents expect their children to find a job as a lawyer or in the government after studying. Furthermore, the educational system was not incentivising critical thinking, resulting in insufficient stimulation for innovation (Interviewee 9, 06.07.2022).

7.2.1.4 Alternative financial instruments

SMEs are challenged by low domestic market demand for processed plastics what challenges their abilities to survive. Thus, access to international markets was fancied to foster the value chain. Nevertheless, **foreign trade** inherits some hurdles. First, foreign trade would open the market to international competition. The international price for 1 tonne of processed plastic waste can be about three times higher than on the Nigerian market. Thus, international trade would generate much higher revenues. However, huge investments in machinery, equipment as well as space and its protection like a fence, for example, would be needed to be able to deliver the large amounts of prepared plastic waste that would be interesting for international buyers. Second, SMEs face an intensified delayed payment structure as stated by Interviewee 13:

> "*Many of us actually have requests a lot of times to export the plastic waste from here to European countries. But the challenge we have is the process of exporting it. And many of these [European] companies actually want you to [...] get the materials to the port and then they pay you. But it doesn't work for us here mostly*." (Interviewee 13, 14.07.2022)

Despite the businesses and infrastructure needed to export exist, getting paid when plastics are shipped or even arrived at the destination would set the SME's business activities on hold. Third,

exporting was linked to organisational hurdles, like paper works, and lacking shared responsibility. Currently, SMEs bear all liability and costs if something happens during the transportation to Europe. Lastly, SMEs refused large purchases by European buyers because they did not feel capable of properly managing and monitoring business. This was also explained by the insufficient time available due to the need of having a professional job next to the waste business.

Since the SMEs' financial needs often relate to **purchasing equipment**, this could also be contemplated as a support instrument. If so, the provision with European machines must be linked to TA to enable Nigerians to use and maintain them. To generate revenues, the machines must additionally meet local circumstances, like the epileptic power supply. Moreover, a specification on the provision of equipment could undermine other needs. As such, other SMEs could benefit more from money, space or human resources, among others.

The entrepreneurs were less interested in **equity finance** as an alternative financial instrument. It must secure benefits for the SME, for example in terms of financial and human resources. Also, they felt pressured by the accompanying need for good economic performance. Interviewee 13 explained:

> "*The recycling industry in Nigeria is still young, is still growing. And it's still like uncharted waters, sort of. So, I need to be sure that we are able to deliver [...] before we start accepting external investments. I mean, we have to be sure [of] what we are doing so that we don't run into bankruptcy and all those kind of things.*" (Interviewee 13, 14.07.2022)

This illustrates that the entrepreneurs do not feel stable enough to make themselves accountable for successful business development, especially when facing Nigeria's uncertain business environment.

7.2.2 Opportunities

7.2.2.1 Accessibility for SMEs

In general, waste SMEs can benefit from recent **developments in Europe**. One investor indicated that contacts within the field of circular economy and expected changes in the European country's government led to attributing higher importance to circular economy in projects in Nigeria (Interviewee 6, 30.06.2022). Thus, if properly implemented, developments in Europe towards greater sustainability can be beneficial for SMEs because the European actors try to translate those into their international activities.

In general, **communication** with the donor was perceived as convenient. The first contacts were established via social media or the Recyclers Association of Nigeria (RAN). Afterwards, they communicated with the European actor via WhatsApp and email. Thereby, the donors were positively recognised as proactive. For example, one European actor reached out to an SME after an unsuccessful application the year before, without them applying again and followed up with calls if the SME did not

reply to an email (Interviewee 11, 05.07.2022). Another positive aspect was the donors' openness to integrating feedback provided by both SMEs and the intermediary.

Once applied, **application processes** were simplified because they were mostly similar across various donors and previously written texts or pitch decks could be reused. One entrepreneur emphasised: "*you have to understand what each person wants and try to narrate your idea or your project down to [that]*." (Interviewee 11, 05.07.2022). Thus, entrepreneurs realised that investors often have a focus topic that should be covered in the application.

7.2.2.2 The financial support

The most obvious identified opportunity financial support can bring is its ability to **address financial gaps**. European actors can constitute an external source for the SMEs, reducing their dependence on private savings and family and friends. Thereby, SMEs can benefit from the funds explicitly tailored to them because it can reduce challenges related to Nigeria's financial market. Although European actors can address only a limited number of enterprises, they included businesses that are mostly underserved, like women and young entrepreneurs or early-stage businesses.

Thereby, SMEs benefitted from the **variety of available support instruments** since their preferred structure is case-specific. Some enterprises were preliminary searching for grants because they fit better to the capital-intensive but low-return nature of the sector. Soft loans were the second-most preferred option. Accordingly, some entrepreneurs preferred money for operational costs because it is needed to run the machines at their optimum. Other SMEs saw clear benefits in being provided with non-monetary support:

> "*I prefer equipment, I don't even want money. I prefer the equipment and then see the value that the equipment is bringing. [...] And linking those big international companies who need my products to buy up whatever I produce [...]. So, it is a win-win. You're interested in the market for the feedstock. I'm also interested in pulling more feedstocks.*" (Interviewee 12, 13.07.2022)

This indicates that preferences highly depend on the SME's needs. Besides, TA linked to financial support was desired.

Another need related to increasing the SME's **purchasing power**. The financial support allowed capital-intensive purchases, like equipment and technology, which could not have been afforded otherwise. It enabled business expansion and thus increased the capabilities for waste treatment. Moreover, less expensive aspects were addressed, like securing a monthly income for the entrepreneurs or the employees. Additionally, the money could be used to incentivize Nigerians to improve their waste disposal behaviour and SMEs were enabled to develop and improve prototypes of their business idea,

afford office spaces, get legal advice and standardise production. In general, SMEs were enabled to contribute to the development of the overall economy. One investor reported on 200 full-time jobs and 271 part-time jobs newly created and about 260 already existing full and part-time jobs supported, respectively, by funding 30 cross-sector entrepreneurs. Out of the total, women accounted for 129 workplaces. The participation rate of women in the funding programme itself was 45%. Thus, SMEs were enabled to expand their own business and improve Nigeria's job market, thereby taking female employees along.

Regarding the payment, most entrepreneurs appreciated the frequently applied **milestone-based approach** by European donors as opposed to one big payment. The stepwise payments allowed donors to measure the SME's impact and steer a continuous process. Additionally, it could allow moments for feedback between the SME and the donor. One investor explained the benefits of the milestone-based structure: "*you know how they say: What is not measured is not done? Is it easier for people to stay on track when they know you are going to come back and ask them for [reports]*" (Interviewee 10, 12.07.2022). This indicates that SMEs were incentivised to progress. Additionally, the provision of regular business reports trained entrepreneurs in monitoring and disclosing the SME's activities.

Additionally, receiving finance over a longer period can secure **regular income** for entrepreneurs**.** Waste SMEs often do not generate enough profits to earn a living which is why some entrepreneurs needed to work alongside the waste business. Investors found that regular financial support can enable entrepreneurs to focus on business development and simplify the SMEs' long-term planning.

Furthermore, some entrepreneurs positively recognised improvements in **data assessment**. First, the kind of data demanded by European donors was commended. During the application process, monthly collection rates, the business strategies and the company's social or environmental impact were relevant. Along the funding process, entrepreneurs appreciated the funder's approach of asking for accumulated data, as explained by Interviewee 13:

> "*Because we work a lot with informal collectors, we might not be able to keep tabs on dashboards. We can do monthly, we can do quarterly, because then we are able to accumulate [the] data we have. So that will make sense for us. And, for example right now, [the donors] ask for the number of collectors that collect a certain amount of waste. That's doable, but when you start asking for the names, the phone numbers, email addresses - some of these guys don't have phone numbers, some of them don't have emails.*" (Interviewee 13, 14.07.2022).

This shows that European donors apply measurements that are adapted to the Nigerian context. Second, data collection was mentioned. Via a simple application on the phone or laptop, SMEs

reported on the source and volume of plastic waste received, processed and sold. This forced SMEs to gather and structure business insights which were also helpful for them in the long term to improve business planning. In general, it was considered as simplifying that most parts of the financial support took place digitally. However, it must be considered that this research was also conducted online and thus stakeholders without digital access were not considered. Third, data verification was handled via uploading photos. All in all, this data assessment helped solve logistical problems and simplified record keeping.

7.2.2.3 Accompanying opportunities

Compared to family and friends as the financial source, European finance was rated as a '*richer package'* for SMEs (Interviewee 10, 12.07.2022). Accordingly, the benefits of **mentorship programmes** were widely appreciated. One entrepreneur emphasised the advantage of European finance in comparison to other funding sources:

> "S*omeone could give you a million dollars and if you don't know how to [use it], you could lose it within three months, [or] even in a shorter time. But when someone [...], even if it's USD500, is able to guide you, able to link you with other [...] key persons that you need, it becomes more advantageous than even the money that was implemented. So, basically for me, aside the money, it's the other things that come with it.*" (Interviewee 11, 05.07.2022)

Thus, it supported business development by providing knowledge on how to manage increasing liquidity and several business-related skills, like pitching Tailored programmes for waste SMEs were missing so far.

Furthermore, SMEs appreciated the **networking** aspect accompanying the financial support. This included peer-learning from other participants of the mentorship programme and international networks. The latter enabled entrepreneurs to present their business idea at topic-related conferences and meet experts, for example. Moreover, European actors sometimes provided a marketplace in which the SME could sell products and search for potential foreign customers what contributed to the SMEs' craving for expanding exports. The interviewed intermediary added that these networks should also be used for increasing mutual knowledge sharing between the donor country and Nigeria (Interviewee 10, 21.07.2022).

Entrepreneurs valued the **reputational benefits** their company gained through participating in European programmes. As elaborated by an entrepreneur:

> "*The sector in Nigeria is too small. Information flies around quickly. So, we got into a programme funded by the Coca-Cola Foundation recently, and I think part of why we were*

selected was because we are already on this [European] programme." (Interviewee 13, 14.07.2022).

Thus, the financial support indirectly opened new business opportunities by simplifying access to other Nigeria-based programmes. Additionally, recipients were found to gain popularity and achieve local approval to sell their products more easily. Furthermore, SMEs could increase revenues, expand to the UK, the US or Canada and improve their credibility, leading to greater attractiveness to follow-up investments and finance from the market.

7.2.2.4 Alternative financial instruments

The interviewed entrepreneurs fancied innovative financial instruments. As such, they would be open to **equipment provided by a European actor**, also to substitute the Chinese machinery they currently depend on and which is accompanied by frequent maintenance needs and downtimes. In this context, the more expensive European machinery was perceived as a "*big win*" (Interviewee 15, 10.08.2022). Related to this, investors expected **leasing** to be an opportunity to promote foreign investments in Nigeria. This could be accelerated by inaugurating an equipment leasing regulatory authority.

The SMEs' staff was expected to be able to handle the new technologies and machinery once they received training on them. This relates to the entrepreneurs' desire for **internship opportunities in Europe**. Some entrepreneurs have shown to be eager for knowledge exchange and great potential was expected in experiencing how both daily business and waste management are done in Europe

Different to the entrepreneurs, some investors and the intermediary recommended **equity finance** as well as **crowdfunding and impact investment** to address the SMEs' financial gap. They stressed that it could potentially increase the funding's long-term impact. When businesses grow, investors would earn dividends, or pay-outs in case of takeovers, which could be re-invested into further SMEs. This could additionally decrease the dependence of public investors on budgets provided by the government (Interviewee 10, 12.07.2022).

Lastly, the intermediary was convinced by the idea that European actors commit to **long-term purchases** of the SMEs' products. This could support SMEs trying to connect to large Nigerian and European companies and address the SMEs' challenge of insufficient market access (Interviewee 10, 21.07.2022). To overcome the related challenge of delayed payment, investors saw potential in **international factoring**[5] which was recently launched in Africa by FCI. However, the related regulatory

[5] International factoring is offered by FCI, the global representative body for the Factoring and Receivables Finance Industry (FCI, n.d.-a). The organisation wants to ease international trade by providing factoring across borders. This means that FCI provides a credit to the purchasing actor for paying the bills of the exporting enterprise. Hence, the exporting country is protected against delays in the buyer's payment and the buyer can Recycling can create a value chain and thus address the insufficient formal service provision and secure an

framework must still be developed and is decisive for the interest of European actors in it (Interviewee 8, 30.06.2022).

8 Discussion

In the following section, the findings for each sub-question are critically discussed and compared to the existing research base. Subsequently, recommendations for the design of financial support and potential further research are developed. Furthermore, limitations are discussed.

Before diving into the research questions, some points demand discussion. First, the author is aware that the research findings are impacted the author's personality and positionality (Darwin Holmes, 2020). Being a white, female German studying in the Netherlands influenced worldviews that were inevitably integrated into the research process. Furthermore, the author's idea of Nigeria and perception of Nigerians is based on having friends from Nigeria who, however, also live in the Netherlands, and work-based relationships. The author has not had the opportunity yet to visit the country. Being aware of this outsider position, it is acknowledged that an unknown bias towards the Nigerian culture has influenced data collection and analyses and interviewees might have been hesitant to share certain information (Darwin Holmes, 2020)

Second, the reasonability of interventions by European actors itself, and thus the purpose of this research, demands consideration. Historically, European interventions seemed to have been guided by the attempts to secure the EU's access to Nigeria's oil resources (Bakare, 2019). However, despite ODA having shown a negative influence on human development in Nigeria, researchers emphasise that this does not mean that the financial aid should be stopped. Instead, they should enforce reliable and transparent monitoring systems to reduce corruption (e.g. Ibietan et al., 2014). Accordingly, all consulted entrepreneurs endorsed the financial support from Europe. However, it also became clear that the efficiency is not optimised yet. Increasing transparency and accountability could reduce the consequences of the resource curse (Idemudia, 2012), but a broader variety of financial instruments is needed to overcome them. Thereby, as identified by Ram (2003), bilateral aid in economic growth might be better suitable to address country-specific needs than multilateral aid. This actually underlines the importance of the study at hand and supports its focus on European actors instead of the European Union.

This also shows that because Nigeria is a rentier state, society needs to be enabled to flourish independently from domestic governmental support. Expanding the plastic waste sector can

income for informal waste pickers, provide manufacturing companies with input materials and help to clean up the plastic waste that is already discarded in the environment. more comfortably transfer the money in its own currency and language, for example (FCI, n.d.-b).

contribute to the diversification of the Nigerian economy what is in line with the SDGs and the PA. Promoting recycling, for example, is additionally contributing to the goals of the EGD. However, this addresses the third point of consideration. Current activities in finance for sustainable development seem to be solemnly focused on recycling aspects. Instead, applying principles of a circular economy should constitute a toolbox for achieving sustainable development rather than being its goal (e.g. Pires & Martinho, 2019). Especially in the waste sector and its informal structures, circular economy principles might clash with health issues, causing tradeoffs with SDGs 3 and 8. Additionally, unregulated recycling, as present in Nigeria, can increase chemical emissions to the environment. Thus, capacity building, training and technology transfers are needed to promote decent jobs, in the informal sector in particular (e.g. Schröder et al., 2019). Nevertheless, focusing on recycling can bring highly needed improvements in waste management, despite consumer habits being unlikely to change in the foreseeable future. This is especially relevant for Nigeria, where many people still cope with poverty and, thus, have to fulfil their basic needs before caring about sustainable aspects of development.

Lastly, it should be emphasised that promoting more sustainable waste management practices in countries like Nigeria is needed but does not replace the need for globally changing consumption and production patterns. This includes reduced consumption behaviour as well as changes in production patterns and product design to allow improved waste treatment. Thus, European actors should engage in Nigeria to support sustainable development but thereby have to act as a partner, always prioritising positive social and environmental impacts in Nigeria for their own economic benefits.

8.1 Sustainability of the plastic waste management sector (SQ1)

The application of the SoS to Nigeria's plastic waste sector enabled the generation of a holistic overview. However, due to the interlinkages of the sub-systems among each other and to the core systems, the structure was not suitable for presenting the results. Nevertheless, these interlinkages substantiated the applicability of the concept of service regimes by Van Welie et al. (2018) to the Global South. Although this research tried to investigate Nigeria as a country, data availability led to most input being related to urban areas, Lagos and Abuja in especial. Thus, the service regime approach was not extended to rural areas but applied to both a new country and a new sector. Based on this, multiple regimes inherent to the waste management sector were identified and ongoing transitions uncovered. Thereby, the importance of considering the complexity and multi-levels of the sector became clear.

Seven service regimes could be identified. The first regime *'collection from source against a fee'* describes the waste collection from waste producers that can pay a fee, namely higher income households and other waste producers, including businesses or public institutions. Depending on local circumstances, the plastic waste could be collected by SMEs, businesses contracted by the government or waste pickers. Over those actors, the plastic waste stream is linked to all other services, vertically

and horizontally along the value chain, besides repair and reuse. Second is the '*formal collection point-regime*'. It complements the previous regime when, for example, the road infrastructure is insufficient for waste trucks. Thus, because it requires a certain degree of formalisation, it probably focuses on middle- and higher-income areas, like the guided communities in Abuja. Waste producers bring their waste to the collection point where, if institutionalised, it will get picked up by contracted businesses or SMEs. Afterwards, the waste becomes probably either landfilled or further processed. If this regime can also not be implemented in an area, the '*informal collection point-regime'* might arise. All waste producers that have either insufficient financial resources or face inaccessible waste infrastructure bring their waste here. Because it is informal, specific waste might be eliminated by waste pickers, but the bulk is mismanaged, mostly via open burning.

Besides these service regimes targeting waste collection, treatment regimes are crucial. Thus, the fourth regime is the '*repair and reuse-regime'*, which is only realised by the poorer parts of society and for non-SUP products, like buckets or water bottles. It is not linked to any of the other service regimes since products that cannot be repaired or reused anymore are included in the waste treatment behaviour of poorer households. This regime maintains as long as the costs for repairing are lower than purchasing new products. Besides this, no financial streams address this service regime. Popular in Nigeria is the '*Littering regime'*. People from all income levels litter products like sachet water or snack wraps everywhere they go. Most of this waste is mismanaged and ends in the environment. Some plastics might be recovered by waste pickers if they can sell them. Additionally, local NGOs engage here via clean-up initiatives. The '*Landfill regime'* is also a popular service, used by all waste producers. When plastics are not directly landfilled, SMEs or contracted businesses might bring the collected waste there. From landfills, waste is predominantly mismanaged or selected by waste pickers. The final service is offered via the '*Processing-regime'*. This regime is probably the latest one and still developing. Since it adds economic value to plastic waste, it receives its input materials predominantly from SMEs or contracted businesses. Due to lacking separation, the collection to landfilling is currently not given. This regime is the only one after which end-of-life plastics are most likely not mismanaged, or if so, in a rather negligible amount. Processing, and related to that recycling, is promoted by international actors, like foreign governments, international agreements and MNCs. Thus, it attracts most academic and international attention, potentially creating the impression that it is dominating the sector's transition. But, the share of recycled materials is low whereas the number of waste producers contributing to the other service regimes is high, indicating that the *processing-regime* currently does not play a major role. Moreover, the stakeholders' domestic commercial banks and academic institutions are mostly unlinked to the regimes. Examining the interplay of the service regimes on the sectoral level, it can be said that while the multiple services are partially aligned internally, they do not work out on the sectoral level. Rather than complementing each other, failing

service regimes are replaced with lower-quality services. This results in regional differences between poor and rich neighbourhoods. This illustrates that Nigeria's plastic waste management constitutes a splintered regime, underlining the classification of Global South cities by van Welie et al. (2018).

To assess the sector's sustainability, the different service regimes must be considered to provide a differentiated picture. Each service regime addresses different levels in the waste hierarchy, as illustrated in Table 7.

Table 7 Sustainability of service regimes in the plastic waste management sector, ordered by decreasing sustainability

Collection Regime	**Leading to treatment regime:**
Collection from source against a fee	Landfilling, reprocessing
Formal collection point	Landfilling, Reprocessing, mismanaged
Informal collection point	Mismanaged, reprocessing
Treatment regime	**Leading to waste treatment strategy (mainly)**
Repair and reuse	Reuse
Processing	Recycling, remanufacturing
Landfill	Mismanaged
Littering	Mismanaged

This shows that the treatment regimes reach different levels of sustainability that can be linked to impacts as identified by Gertsakis and Lewis (2003). The *repair and reuse-regime* achieves the most sustainable treatment method. Environmental impacts are minimised and negative impacts due to producing virgin materials can be avoided and other treatment methods, like landfilling, can be reduced. The repairing aspect carries economic potential for refurbishing businesses and costs can be saved for consumers due to decreasing purchases. The *processing-regime* mainly targets the recycling method but can also prepare plastics for energy recovery. The latter is however not common in Nigeria. Processing can prevent plastics from being landfilled and can reduce the production of virgin materials. Additionally, it can bring new business opportunities along the value chain. However, the effectiveness of this regime is restricted due to the lack of waste separation, especially at the source. The *landfill-regime* is economically beneficial since it is related to low disposal costs and thus accessible for large parts of society. However, it can rarely provide job opportunities and landfilled plastics are mostly mismanaged, precisely burned, increasing GHG emissions and negatively impacting human health. The *Littering-regime* is common in all parts of society and does not bring any sustainable benefits. It leads to environmental degradation, which is subsequently leading to decreasing human health, for example. Moreover, it does generate an economic potential for waste pickers, for example, due to littered PET bottles, but also directly creates costs for clean-up initiatives.

The collection regimes show that the more formalised the collection is, the greater the sustainable potential. However, public services are failing and have shown to be rarely present in Nigeria. Thus, private stakeholders organise collection that is, however, attached to economic compensation. Thus, informal collection points might be the most relevant to Nigeria's society, leading predominantly to plastics being mismanaged.

To summarize, it can be said that the overall sustainability of the plastic waste management sector is low. The two rather independent service-regimes 'repair and reuse' and 'littering' are probably the most common in terms of people contributing to these services. While the first regime can be seen as highly sustainable, the latter one is highly unsustainable. The *processing-regime* can be considered sustainable, however, it is so far underdeveloped in Nigeria and linked to the high contribution of the informal sector. The latter restricts the regime's sustainability since it is mostly accompanied by insufficient health and safety regulations for waste pickers. The service regimes are more interlinked but mostly guide plastics towards being landfilled. Thus, the establishment of collection practices can guide plastics away from the *Littering-regime* but is still linked to treatment methods low in the waste hierarchy. Additionally, since the collection is mainly present in well-off neighbourhoods, it currently increases the discrepancy between Nigeria's rich and poor inhabitants.

8.2 Policy goals and the sector's sustainability transitions (SQ2)

The second research question aimed at investigating the political agenda regarding the sector's sustainability transition. Thereby, it emerged that the political interest of most parts of the federal government in the sector is negligible. While this does not include all governmental employees, this is common behaviour for governments of rentier states (e.g. Sandbakken, 2006). Nevertheless, while the national government announced to seek alignment with international agreements like the SDGs and the PA, State and regional governments are more precise. They aim at increasing recovery rates of plastic waste and the formalisation of the sector. This is also in line with the influential MNCs that began to engage in clean-ups and promotion of recycling practices to shift towards a circular economy.

Those goals might be suited to satisfy the international public for which development and circular economy are currently important buzzwords. However, it disregards difficulties that might arise due to the complexity of the several service regimes. For example, the reduction of poverty is a key goal to support Nigeria's inhabitants. However, consumers increasing their economic wealth are less likely to engage in the *repair and reuse-regime.* Instead, the waste producers could be guided towards the *processing-regime,* what would increase the share of people contributing to recycling practices, thus contributing to the targets of increasing recycling rates. While this would be beneficial for MNCs and the federal government to communicate, this withholds that the additional shares were taken from a more environmentally friendly regime. Additionally, considering the current interlinkages of the

system, it is highly unlikely that the poor household can immediately be integrated into the *processing-regime* but would engage in the *landfill-regime* first, having even worse environmental impacts. This is also important regarding the EU pushing Nigeria to become a signatory of the EPA. While it might result in more affordable (plastic) products for society, the EU must consider the accompanying impacts. Since governmental cooperation might be ineffective to support the guidance towards the *processing-regime,* approaches like the Ultimate Producer Responsibility (UPR), as currently explored by Thapa et al. (2022) for electronic waste shipped to developing countries. UPR suggests that manufacturers bear the full financial responsibility of collecting and recycling waste, focusing on the highest achievable waste treatment strategy, independent from the geographic end point of a product.

The goal of increasing energy recovery from waste can accelerate the *processing-regime* because it adds another treatment method. The increasing demand for plastic waste input could incentivise the business expansion of SMEs and thus increase collection activities. The introduction of polluter-pays and EPR principles is unlikely to be successful due to the lacking governmental and legal enforcement. This holds for the ban of SUP, even though that could reduce the plastic inflow to the *Littering-regime*.

To summarize, it can be said that the existing political goals are in line with international agreements like the SDGs and the PA. However, because Nigeria is a rentier state, the sector's transitions are locked into already institutionalised patterns. The domestic policy-making loses relevance and domestic and international private actors might be more important to consider. Thereby, MNCs are especially promoting the move towards a circular economy. This hints at the impact of European policy-making. Integrating the system of the service-regimes in the decision-making of international actors can support the achievement of intended changes, adapt international targets to the Nigerian context and avoid unexpected pitfalls.

8.3 The role of SMEs (SQ3)

SMEs mostly cover several steps along the waste value chain, potentially caused by the unstable business environment and lacking alternatives. The first may demand the diversification of business activities to reduce the sensitivity to unexpected changes. For example, the quickly changing political framework could introduce taxes on certain business activities, making it too expensive to continue. Lacking alternatives refers to the underdeveloped sector itself. The ineffective formal service provision could attract SMEs to cover aspects from transportation to sorting. Differently, SMEs often specialise in the treatment of certain plastics. This is reasonable since it is economically driven which plastics are collected. However, it results in other plastics being left on the streets, for example.

Uncovered by investigating the interlinkages in the plastic waste management sector, SMEs have shown potential to be a leverage point for improving sustainability aspects of the triple-bottom line. First, they fill the gap in the collection that arises if businesses contracted by the government do not

provide their service. Because SMEs are revenue-seeking enterprises, they do not depend on payments from the government. Nonetheless, the government has a limiting impact on the SMEs, for example, because the quickly changing policy framework and taxation systems hamper long-term planning and profitability. Simultaneously, this profit-seeking nature is likely to focus the SMEs' business activities on formalised collection processes and thus on wealthier districts.

Secondly, SMEs constitute a collection point for waste collected by waste pickers, what might be one of the most important contributions to increasing sustainability. SMEs attract waste pickers to deliver collected waste due to the compensation with money or useful items. Besides contributing to an income for mostly poor waste pickers, this system is environmentally beneficial. The waste pickers collect plastics from the *Littering*, *Landfill* and *informal collection point-regimes* as well as from households that are willed to pay a fee. Therefore, they directly prevent plastics from being mismanaged and recirculate the disposed waste into the value chain. Additionally, most business models demand the waste pickers to register in systems that enable them to receive compensation. This positively contributes to the sector's formalisation and improves data monitoring. Similarly, SMEs often cooperate with NGOs and participate in clean-ups or further process the plastics collected thereby. Depending on the broadness of the SMEs' activities, they also engage in the preparation of plastics for further processing, including separation and washing. Thus, SMEs can contribute to the establishment of the *Reprocessing-regime* by redirecting plastic waste from less sustainable treatment-regimes.

A third aspect is that, due to increasing the inflow of materials for further reprocessing, SMEs can deliver the needed quantity of recyclable materials and secure input materials for manufacturing companies. This can increase Nigeria's independency from international markets. Fourth, by contributing to the evolvement of the value chain, the plastic waste management sector could become attractive enough to support the diversification away from the oil sector. Fifth, SMEs depend on collaboration with other stakeholders along the value chain and thus promote multi-stakeholder approaches.

Negative impacts include that increasing the waste pickers' livelihood might reduce the relevance of the *reuse and repair-regime*. However, this is, again, subject to research addressing consumption behaviour. Nonetheless, SMEs consulted in the study at hand have shown to barely engage in waste treatment strategies higher in the waste hierarchy. This could be caused by perceiving repairing, for example, as a poverty-related necessity but not as an innovative business idea.

Thus, SMEs can be an important driver of change in the plastic waste management sector and can potentially contribute to Nigeria's long-term vision in terms of decreasing environmental degradation, formalising the sector, increasing GDP from non-oil sectors and increasing employment, even without

full governmental support. Because they are profit-driven, they are likely to develop effective business strategies evolving from and with the Nigerian context. However, being low-carbon and climate resilient is probably not high on the SME's agenda since they must first worry about surviving in the market.

8.4 Challenges and opportunities (SQ4)

The following chapter will critically reflect on the challenges and opportunities and interlink them to and complement the current research base.

8.4.1 Accessibility for SMEs

Compared to the existing literature, this research confirmed some challenges and opportunities experienced by SMEs in both other African developing countries (e.g. Abor & Quartey, 2010) and sectors (e.g. Haselip et al., 2014). As such, European financial support constitutes a needed additional source of income, fostering the SMEs' independence from trade credits, thus credits from suppliers or customers and friends and family, which are typical income sources for SMEs in SSA (Kuntchev et al., 2013). However, while MSMEs are greatly targeted by European support programmes (e.g. EC, 2021a), SMEs, in particular in the waste sector, face limited opportunities. Additionally, existing projects were rarely aligned, hampering the optimisation of their impact. Furthermore, the investors were rather homogenous. Neither domestic private stakeholders and commercial banks nor foreign private sector investors are recognisably active in Nigeria's plastic waste management. This indicates that the sector is not generating profits yet, potentially caused by the underdeveloped value chain and low purchasing power of the households which constitue a major source of income. Additionally, the waste sector has an unattractive reputation (Interviewee 5, 17.05.2022). The projects promoted are also homogenous, focusing on recycling initiatives. Other coping strategies, like repairing are not addressed. Moreover, an easily accessible overview of available programmes was not available. Instead, entrepreneurs were informed about the programmes via social and business-related networks.

Moreover, it is remarkable that most programmes from European government institutions were limited to the South East geopolitical region, inhabiting Lagos. This area is seen as the entrepreneurial hotspot and one of the best-developed areas in Nigeria (e.g. Solomon Osho & Adishi, 2019). The centralisation of the bilateral support mechanisms might intensify inequalities among the geographical locations. This is especially challenging for the sector since plastic waste is produced all over the country, hence demanding its management everywhere. Oppositional to that, non-governmental support has shown to be more accessible. For example, Empower also includes SMEs based in other geopolitical zones than the South East.

Moreover, since Nigerians mostly do not get educated on business skills in regular educational programmes, pitching as a selection method can favour entrepreneurs that either received training on presenting already or are well-educated on sustainability topics, enabling them to point out certain buzz-words and thus indicating that they might come from a wealthy social background. Nevertheless, while the investors must, undoubtedly, apply selection criteria to not waste their investments, non-financial eligibility criteria are needed. If a European actor would apply the same criteria as commercial banks, it would not constitute an alternative financial source because they would cancel out the same businesses as the banks. Related to eligibility criteria, it became also clear that investors should apply a definition of SMEs as done by SMEDAN (2021), for example. The questionnaire illustrated that the European criteria regarding the financial impacts are way too high to be just adapted to the Nigerian context.

8.4.2 The finical support

The size of the financial support was found insufficient to meet SMEs' needs. However, if EU actors focus on fewer SMEs to increase the height of instalments, the investment-related risks per project increase. Additionally, the incomplete coverage of financial needs can incentivise SMEs to generate revenue streams and attract additional investors themselves (Clements et al., 2004). This would support the SMEs' abilities to cope with the real market.

Regarding the structure of the payments, SMEs favoured milestone-based payments. This is surprising since most financial needs relate to purchases with high upfront costs. However, this might indicate that entrepreneurs actually prefer the TA accompanying the financial support from Europe. Especially regarding the need to enable SMEs to attract finance by themselves, TA could be a reasonable option.

The challenge of long-term survival is a reoccurring point that could also explain the craving of entrepreneurs for a stabilising financial system. As such, they favour financial support that is predictable, reliable and preferably continuing for a long time. First, unpredictable payments were caused by both delayed instalments from financial support as well as the time difference between producing products and getting remunerated. Second, reliability was challenged by the financial support's sensitivity to changes in the donor country. This can have impacts in negative and positive directions and is relevant to both governmental and private investors. The first one rather depends on political discourses in the donor country whereas the latter is impacted by market forces. Lastly, support cannot be paid infinitely and this aspect validates the criticism of creating long-term dependencies of SMEs on foreign actors due to international financial aid.

In line with academic literature, the choice of intermediaries is debatable (e.g. Glennie et al., 2012). While entrepreneurs stressed the importance of choosing trust-worthy, preferably European agencies to avoid corruption, some European financial interventions are channelled towards or through

governmental actors. However, underlined by research on the natural resource curse and rentier states, at least part of those investments are unlikely to be forwarded to SMEs as a consequence of corruption. Nevertheless, cooperation with governmental actors can support those individuals that are interested in improving the political framework. For example, the NCEWG could be an option to discuss waste-related topics while applying a multi-stakeholder approach.

Similarly, the choice of domestic commercial banks as an intermediary is critical. Because of their requirements linked to credits, SMEs are not interested in this source of finance. Simultaneously, the bank is not interested in investing in SMEs. This pattern was also recognised in Ghana and Senegal (Haselip et al., 2014). The impression of the interviewed entrepreneurs that the financial support was accompanied by reputational benefits would endorse the 'demonstration effect'. This assumes that FDIs follow investments previously made by investors if the goal has shown to be reliable. For example, foreign firms would settle in a country in which other foreign firms have already successfully started a business before (Barry et al., 2003). While this might hold for other rather philanthropic investors, as reported by the Interviewees, Haselip et al. (2014) found that this demonstration effect did not accelerate the willingness of domestic commercial banks to invest in SMEs. Besides high opportunity costs, one main explanation for this was that SMEs receiving financial development aid depend on concessional loans and are not able to survive when facing the real market. An alternative to increasing the SMEs' credibility and, thus, ability to access finance from the market, could be issuing certificates. Those could demonstrate that an SME joined training or apply certain business operations, for example. The increasing credibility is an important base for highly-needed follow-up investments

8.4.3 Accompanying aspects

Investors and entrepreneurs disagreed regarding the currency of instalment. Investors prefer payments in Naira to avoid the embezzlement of money when transferring the currencies in Nigeria. However, due to the high and frequently changing exchange rates, it might be beneficial for SMEs to receive payments in EUR. This is especially relevant if the financial support shall be used for purchasing equipment since those are mostly imported and thus not paid in Naira. So far, Nigeria's economy is predominantly cash-based but technological solutions are uprising via platforms like Quickteller and Remita. Furthermore, fintechs are popular (Chambers and Partners, 2022). This could be a relevant option to actors, like the EU, providing their finance via intermediaries to reduce corruption and overcome market flaws. Nonetheless, it must be considered that only 36% of Nigeria's population used the Internet in 2022 (The World Bank, 2022). This limits the potential of online services to developed regions and wealthy inhabitants.

Moreover, investors try to overcome the data unavailability by demanding information on the SMEs' social and environmental impacts. However, KPIs for the impact assessment were missing. Instead,

qualitative assessments are conducted, leading to the need for great presentation skills of the entrepreneur and thus subjectiveness in the selection process, for example. Fostering an intuitive data assessment is beneficial for both sides and supports data-based business planning.

The findings from the online survey indicate that distrust toward European donors might restrain SMEs from applying to the support programmes. In combination with the impression of interviewed entrepreneurs that the donors do not sufficiently consider their social and environmental impacts in their decision-making, this hints at a lack of transparency regarding the donors' intentions. Another point of consideration could be the religious beliefs of the entrepreneurs. While this aspect turned out to be rather irrelevant in this research, it should be considered by investigations focusing on Nigeria's northern area, especially where Boko Haram is active.

8.4.4 Alternative financial instruments

The variety of currently available instruments is rather insufficient to address the diverse needs of SMEs. While European actors try to focus on the provision of TA, its impact is limited by the unavailability of follow-up measurements.

One key challenge to the sector is the underdeveloped domestic market for processed plastic waste. To address this the demand, both domestic and foreign, could be increased. Domestic demand could be promoted by expanding the *processing-regime.* Recycling could be accelerated by domestic manufacturers being forced to increase the share of secondary plastics in their products. But this is unlikely to be successfully enforced because of the weak governmental framework. Energy recovery, however, could be established by financing green infrastructure projects as done by actors like the C40 Climate Finance Facility (e.g. Merk et al., 2012). Foreign trade is financially attractive to SMEs but is challenged by delayed payment and the lack of shared responsibility. The former can be addressed by accelerating International Factoring in Nigeria. The latter is especially relevant since Nigerian entrepreneurs have shown to be risk-averse and avoid being responsible for meeting expectations from externals. Furthermore, foreign engagement would impact local market prices as well. Most likely, the market price for plastic waste would increase, diminishing the purchasing power of local actors.

Furthermore, the demand for European equipment was communicated, especially since the currently used machinery is working unsatisfyingly. Related to that, leasing could be an option. Thereby, the European actor can purchase tangible assets and stay their legal owner. The ownership, including all benefits, costs and risks associated, is conveyed to the beneficiary (International Monetary Fund, 2000). However, the regulatory frameworks for this instrument are not developed yet and the interest of entrepreneurs was not explored. Another option suggested by interviewed entrepreneurs is that European businesses provide their discarded equipment to Nigeria. While this initially feels like a top-

down approach, it must be considered that the Nigerian environment can mostly not yet work with high-speed internet or Artificial Intelligence, for example. Passing the equipment replaced in Europe to Nigeria could thus be a more circular option as opposed to discarding it. However, a life cycle assessment would be needed to compare the environmental impacts of transporting the machinery to Nigeria to the alternative end-of-life treatment. Additionally, the useability of the equipment in machinery is critical since, for example, waste trucks face different infrastructure than in Europe. If this method is found to be reasonable, European actors could run a platform linking European businesses with Nigerian enterprises. For example, European governments could cover the additional costs that European businesses would face when transporting the equipment to Nigeria instead of traditional disposal.

To improve knowledge transfers, implementing exchange programmes could be an option. Thereby, Europeans and Nigerians could benefit from mutual exchanges as opposed to only offering internships in Europe to Nigerians. Currently, active donor countries include countries like Germany, the Netherlands and Norway, all countries that are pioneering waste treatment themselves. This carries great potential for effective solutions and knowledge sharing. Thereby, Nigerians should be encouraged to apply critical thinking to question the lessons learned from European actors, for example regarding their applicability to the Nigerian context. Additionally, TA is more effective when it is offered in combination with other instruments because participants need something to go back to and apply the new knowledge. Accordingly, programmes to connect SMEs to follow-up funders can support their long-term survival. For this, approaches like the Innovation Challenge are suitable.

Another option could be that European actors take on the role of the national government to promote PPPs. For example, they could contract businesses to conduct waste collection in poor neighbourhoods since private business initiatives are unlikely to occur there. However, this might clash with the business attitude of the interviewed entrepreneurs who seem to avoid long-term responsibilities

Equity finance as an alternative instrument is currently not relevant. SMEs do not feel developed enough to accept this kind of finance, despite the shareholder would bring in fundamental benefits. Accordingly, private investors do not use those instruments, indicating that the interest in the sector is low, probably caused by risk perception. Nonetheless, the intention of reinvesting profits into the sector is desirable. As such sustainable bonds might become an option when the financial market stabilised enough.

8.5 Recommendations

Based on the examination of the circumstances for SMEs in Nigeria's plastic waste management, several potential points of improvement for financial support targeted to them were uncovered. These

aspects hamper the SMEs' potential to contribute to a more sustainable sector. Thus, the design of financial support is proposed which would achieve the following:

- Increase to availability of financial support to waste SMEs in terms of economic value and total number;
- Optimise its efficiency due to alignment with other, and especially already existing, support programmes;
- Offer a variety of instruments that complement target-specific financial support with training on waste and/or business-related topics;
- Be accessible to SMEs based in all regions of the country;
- Be accessible for all entrepreneurs, but secures the involvement of underserved groups, like women, youth, urban-based and Islamic entrepreneurs;
- Serve diverse businesses, including aspects of the waste treatment method applied or the type of plastics specialised on. This also means potentially favouring collection regimes, especially in poor neighbourhoods, for example via PPPs, and support the *reuse and repair-regime* instead of recycling;
- Be based on decision-making that is as objective as possible to avoid favouritism. This entails choosing participants based on non-financial criteria, underpinned by tangible KPIs adapted to the Nigerian context and offering financial support based on market assessment instead of the entrepreneur's estimations;
- Provide instalments as previously agreed, concerning the timeline and size of the financial support;
- Apply a milestone-based approach to payments, when possible, that however allows the reconsideration of previously agreed timelines and goals in light of changes in the business environment;
- Provide money via online payment solutions and fintech, when possible, but also provide offline solutions;
- Support addressing the challenge of delayed payments by accelerating innovative instruments like international factoring;
- Scale up network effect, including peer- and international mutual learning, connection to domestic MNCs;
- Cooperate with Nigerian governmental actors for non-monetary projects, but avoid their involvement in financial flows;
- Channel financial flows not towards credit lines targeting cross-sectoral MSMEs offered by domestic commercial banks;

- Include local academic institutions in the support programmes;
- Implement transparent and detailed record keeping with the intermediary to impede corruption;
- Offer a simple system for data monitoring to entrepreneurs, targeting easily collectable and provable, for example via photos, data on material flows, revenue streams, employment numbers and other business-relevant figures;
- Demand regularly business reports from beneficiaries to foster their progress and data assessment thus teaching hands-on business skills;
- Be highly transparent to the public regarding applied criteria in decision-making, the timeline of the application and the motivation of investment;
- Consider the interlinkages of the sector's service regime to avoid unsustainable pitfalls;
- Consider potential tradeoffs between circular economy and sustainable development;
- Support preliminary the domestic market for plastic waste, as opposed to foreign trade;
- Favours mutual learning compared to top-down approaches from Europe towards Nigeria;
- Have an office based in Nigeria;
- Apply a Nigerian-specific definition of SMEs;
- Be listed in a new, publicly accessible platform that provides an overview of the existing programmes and allows comparison among them to easily identify the best suitable option for an SME.

8.6 Further research

The study at hand supports getting insights into why and how SMEs might be supported in light of the sustainability transitions of plastic waste management. Nevertheless, one of its main contributions may be that it rises several aspects for future studies.

As such, all of the before mentioned recommendations demand feasibility studies for their application to Nigeria. Additionally, the findings of this research could be validated by large-scale quantitative research to confirm or refute made assumptions. Therefore, to be able to holistically assess an intervention's impact, a preceding, more elaborate investigation of the sector's service regimes is needed. Casual relationships should be tested to assess first relevant leverage points and second the impact of changing those. This can also allow the investigation of possible pathways for increasing sustainability, including the exploration of the potential of treatment strategies high in the waste hierarchy. Furthermore, attempts could be undertaken again to first improve data collection, for example by developing new systems, and second, assess the quantitative values of the waste flows. For instance, a Sankey diagram could contribute to the understanding of the current plastic waste value chain. Moreover, the impact of international interventions like the EGD on Nigeria demands

further investigation, maybe by comparing it to the impact of previous multinational agreements to enable assumptions about long-term consequences. Lastly, the findings of this study can be compared to other countries or sectors to identify patterns and thus contribute to mutual global learning.

8.7 Contribution/Generalisability

While the focus of this research is tight, the study carries the potential for generalisability. Nigeria is similar to other developing countries in Africa regarding technological and economic developments. Additionally, it is highly oil-dependent, making its case generalisable for oil-exporting countries (Osunmuyiwa et al., 2018). Furthermore, Nigeria is only one of the (costal) countries facing massive plastic pollution. Learning can be used for other countries, especially those contributing to marine pollution. Lastly, the applicability of the service regime approach has shown that Nigeria's cities show similar patterns as experienced in other cities in the Global South.

8.8 Limitations

Although the results provide fairly precise findings, it is appropriate to recognise potential limitations. First, the scope of the study was small, restricting the generalisability and robustness of the findings. Second, the researcher was based in the Netherlands and could not conduct field research. This also resulted in the exclusion of those interviewees without access to the Internet. Third, data availability for the case study is limited. Whereas it was initially attempted to cover Nigeria as a whole, the existing literature base and interview partners were mainly related to Nigeria's main cities, namely Abuja and Lagos.

Although the generality of the results must be generated by further research, the present research has provided in-depth information on the SMEs' situation by including deductive reasoning enabled due to the consultation of diverse stakeholders. Thereby, the study focused on Nigerian and Nigeria-based stakeholders and included their personal experiences to overcome the obstacle of not being physically present in Nigeria. Furthermore, the study updated previous findings as good as possible, for example by adapting figures to the latest available numbers found.

Thus, despite the limitations, this research can be considered a first step towards integrating the service-regime approach to designing financial instruments. To the author's knowledge, that has not been directly linked before.

9 Conclusion

The present research answered the research question *How can European actors financially support SMEs active in Nigeria's plastic waste management as a means to aid in achieving the local sector's sustainability transition?* For this, a mixed-method approach was applied, including the review of the

existing literature base, collecting insights from Nigerian SMEs through an online survey and conducting actor interviews with people working in SMEs, investors and further actors relevant to the topic.

Data collection guided by the System of System approach allowed uncovering system-regimes inherent to the plastic waste management sector and their interlinkages. While each service-regime achieves a different level of sustainability, the overall sector can be rated as unsustainable. Current interlinkages promote a linear value chain and the most sustainable options are either likely to become less popular due to economic development, such as the reuse and repair culture, or are underdeveloped, like the processing-regime. Additionally, the sector is missing clear goals which could guide the transitions of the identified service regimes towards greater sustainability. Due to the consequences of the natural resource curse, the engagement of the Nigerian government is highly insufficient, resulting in political goals that are in line with international agreements like the SDGs but lack implementation and enforcement. Thus, the goals guiding the transitions of the sector refer to international agreements and the business interests of MNCs. Those promote the shift towards recycling, thereby neglecting the indirect impacts this transition can have.

In this complex sector, SMEs have shown to be a central point of the interlinkages. Regarding their role in the plastic waste management sector, it can be said that, while they currently lack financial and institutional support to scale up, they have the potential to support the sector's sustainable transition. SMEs can accelerate formalisation due to integrating waste pickers into the value chain and could cause increasing waste collection rates, which is likely to prevent waste from being mismanaged. However, to be able to use their leverage potential, they need, among others, financial support. Due to the lacking interest of the domestic government, actors like European governments or sustainable private institutions become key for that. Thereby, the currently offered financial support is limited in both absolute numbers and economic value provided. Additionally, its accessibility is restricted, for example, due to the focus on Lagos what could foster unequal business opportunities across Nigeria. Important critical points are the potential long-term dependencies that can arise due to achieving development finance and the involvement of actors from the Nigerian government, caused by high levels of corruption. Nonetheless, previous financial support from Europe has shown to enable business activities that would not have happened otherwise. The money can enable companies to consider socially and environmentally beneficial aspects in their business models. However, the main benefits for SMEs arose due to accompanying impacts. This includes the possibility for knowledge sharing and networking as well as improving data processing and capabilities for long-term planning, among others. Furthermore, several further financing instruments were identified as potentially suitable. However, their application is case-specific depending on the SMEs' needs. Based on this, several recommendations for European actors were derived, focusing on aspects like offering a greater

variety to the SMEs and better considering the local context. Great importance was also dedicated to increasing transparency which can also contribute to reduced corruption.

Thus, Nigeria's plastic waste management sector is a highly complex system in which SMEs play a crucial role regarding connecting so far loose ends. Europen actors can support SMEs to accelerate positive contributions to society and the environment. SMEs and their independent long-term survival should be the first priority in investment decisions, enabling investors to make a long-lasting positive contribution.

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Annex A: Email contact to potential Interviewees (SQ1-3)

Annex A.1: Draft – Invitation for actor interview

Dear Sir or Madam,

My name is Maja Biemann and I am a master's student in Sustainable Development at Utrecht University (the Netherlands). I am contacting you because *XXX* is a key player in promoting sustainable plastic waste management in Nigeria.

I am currently writing my master thesis on how the European Union can meaningfully support Nigerian small and medium-sized enterprises (SMEs) that are active in the local plastic waste management to eventually promote a circular economy. I would highly appreciate talking to one of your academics to complete my overview of the circularity of the local plastic waste management sector and the role that SMEs play in that. Furthermore, I am interested in the challenges SMEs face and possible solutions to them. *XXX* is active in several projects and initiatives related to the plastic waste sector and I am sure that both your personal expertise and insights from those projects will be of great additional value to my research.

Therefore, I would like to invite someone having the respective knowledge to a 30 to 45 minutes online interview. If you can make the time, please inform me about your availability. For me, it would be best at some point in the coming week. If you have any questions in advance, feel free to contact me.

I thank you in advance and am looking forward to your answer.

With kind regards,

Maja Biemann

(Utrecht University/Trinomics B.V.)

Annex B: Email contact to questionnaire participants

Annex B.1: Draft – Invitation for online questionnaire

Dear Mr/Ms *XXX*,

My name is Maja Biemann and I am a master's student in Sustainable Development at Utrecht University (the Netherlands). I am reaching out to you specifically because you are the founder of *XXX*, a key player in Nigeria's plastic waste management.

I kindly ask for your participation in this 10-minutes online survey that I am conducting to collect input for my master thesis. The thesis is about how the European Union can financially support Nigerian small and medium-sized enterprises (SMEs) that are active in the local plastic waste management to eventually promote a circular economy. More information on the survey is provided via the survey link: https://s.chkmkt.com/?e=275487&d=e&h=43474F550E3AF48&l=en

Your input would be highly appreciated and can allow me to gain further insights into how Nigerian SMEs use European financial support and which challenges they face by doing so. Your input can also be helpful to draft recommendations on how to address these challenges. Your data will be used anonymised.

Your input will certainly be of additional value to me. I would like to ask you to fill in the 10-minutes survey by 26 June 2022. (Later responses cannot be taken into account, unfortunately.)

Lastly, please feel free to share the survey link (https://s.chkmkt.com/?e=275487&d=e&h=43474F550E3AF48&l=en) with your network and other companies working in the plastic waste management to optimise the survey results.

If you have any questions, please don't hesitate to send an email to me (m.biemann@students.uu.nl)

I am hoping for your participation!

With kind regards,

Maja Biemann

(Utrecht University/Trinomics B.V.)

Annex B.2: Draft – Forwarding invitation for online questionnaire

Dear *XXX*,

My name is Maja Biemann and I am a master's student in Sustainable Development at Utrecht University (the Netherlands). I am reaching out to you specifically because Nigeria Climate Innovation Center is a key player in supporting Nigeria's sustainable enterprises.

I currently write my master thesis on how the European Union can financially support Nigerian small and medium-sized enterprises (SMEs) that are active in the local plastic waste management to eventually promote a circular economy. For this, I conduct a 10-mins online survey. This is targeted to Nigerian SMEs (10-249 employees) that are active in the plastic waste management - from waste collection, to processing, to advocacy.

I kindly ask for your support in sharing this 10-minutes online survey. The thesis is about More information on the survey is provided via the survey link: https://s.chkmkt.com/?e=275487&d=e&h=43474F550E3AF48&l=en

I would be really thankful if you could forward the link to companies that you consider as eligbile fpr this short survey.

If you have any questions, please don't hesitate to send an email to me (m.biemann@students.uu.nl)

I thank you in advance!

With kind regards,

Maja Biemann

(Utrecht University/Trinomics B.V.)

Annex B.2: Reminder 1 for online questionnaire

Good morning,

I hope you have had a good weekend.

With this email, I want to draw your attention again to my previously sent email (see below).

Your input into this 10-minutes online survey on EU finance and Nigerian SMEs would be highly appreciated. You can open the survey via this link: https://s.chkmkt.com/?e=275487&d=e&h=43474F550E3AF48&l=en

If you have any questions, I would be happy to clarify them.

Best regards,

Maja Biemann

(Utrecht University/Trinomics B.V.)

Annex B.3: Reminder 2 for online questionnaire

Dear *XXX*,

Many Nigerian businesses have already participated in my 10-minutes online survey on finance from European actors.

Since I would still highly appreciate your participation, I am sending you this final reminder. The survey is open until 26 June 2022 and you can access it via this link: https://s.chkmkt.com/?e=275487&d=e&h=43474F550E3AF48&l=en

If you have any questions, please feel free to send me an email (m.biemann@students.uu.nl).

Have a good day,

Maja Biemann

Annex C: Email contact to Interviewees (After questionnaire)

Annex C.1: Invite for follow-up interview (Participants)

Hello *XXX*,

thank you again a lot for your participation in my online survey on EU finance for SMEs in Nigeria.

Your input was already of great additional value to me and I'm thankful that you indicated to be open to being contacted for a follow-up interview. Your case seems interesting to me and I would still appreciate it if you would find the time for a 30-45 minutes online interview. I would like to elaborate a bit on the circumstances around your business activities and the role of European donors in this.

Please feel free to indicate a suitable time slot. For me, Friday (the whole day), Monday (04 July, between 09:00 and 13:00) or Tuesday (05 July, also the whole day) would work for example.

I'm looking forward to your answer.

Best regards,

Maja Biemann

Annex C.2: Invite for follow-up interview (Non-participant)

Dear *XXX*,

My name is Maja Biemann and I am a master's student in Sustainable Development at Utrecht University (the Netherlands). I am contacting you because *XXX* is an innovative key player in promoting sustainable plastic waste management in Nigeria and has received funding from a German organisation.

I am currently writing my master thesis on how European actors can meaningfully support Nigerian small and medium-sized enterprises (SMEs) that are active in the local plastic waste management to eventually promote a circular economy. I would highly appreciate talking to you to get insights into the challenges and opportunities that *XXX* faced when receiving the financial support. This might help me in identifying improvement leverages for the European actor.

XXX is a pioneer in the plastic waste sector and I am sure that both your personal expertise and insights from the business operations will be of great additional value to my research.

Therefore, I would like to invite you to a 30 to 45 minutes online interview. Preferably, I would like to speak to you in the coming week, maybe on Tuesday or Wednesday? However, I am rather flexible so please feel free to inform me about your availability.

If you have any questions in advance, don't hesitate to contact me.

I thank you in advance and am looking forward to your answer.

With kind regards,

Maja Biemann

(Utrecht University/Trinomics B.V.)

Annex C.3: Invite for interview (Investor)

Dear *XXX*,

My name is Maja Biemann and I am a master's student in Sustainable Development at Utrecht University (the Netherlands). I am contacting you because *XXX* is an innovative key player in promoting sustainable plastic waste management in Nigeria and many of the people I already spoke to were involved in your network.

I am currently writing my master thesis on how European actors can meaningfully support Nigerian small and medium-sized enterprises (SMEs) that are active in the local plastic waste management to eventually promote a circular economy. I would highly appreciate talking to you to get insights into the challenges and opportunities that SMEs face when receiving financial support - from the perspective of a financial support provider. This might help me identifying improvement leverages for the European actor.

XXX is a pioneer in the plastic waste sector and I am sure that both your personal expertise and insights from the business operations will be of great additional value to my research.

Therefore, I would like to invite you to a 30 to 45 minutes online interview. Preferably, I would like to speak to you as soon as possible, maybe on Monday morning at 11:00 or at some point on Tuesday? However, I am rather flexible so please feel free to inform me about your availability.

If you have any questions in advance, don't hesitate to contact me.

I thank you in advance and am looking forward to your answer.

With kind regards,

Maja Biemann

(Utrecht University/Trinomics B.V.)

Annex C.4 Invite for written questionnaire

Dear *XXX*,

I hope you are doing fine.

Please find attached a written questionnaire. I would highly appreciate it if you can find the time to answer the questions. It is more than fine if you provide information in bullet points, especially considering your busy schedule.

If you have any questions, please feel free to reach out to me.

I thank you in advance!

Best regards,

Maja Biemann

Annex D: Interview guidelines

Annex D.1: Interview guideline (Draft, SQ1-3)

Opening questions

1. What is your proficiency?
2. How is your work related to circularity?

Main questions

1. How would you describe the current state of circularity in the plastic waste management in Nigeria?
2. What is driving change in this sector?
    a. International pressure
    b. Awareness of society
    c. Financial aspects
    d. Environmental aspects
3. Who are the main actors in promoting circularity?
    a. Government
    b. Companies
    c. Civil society
4. What role do SMEs play in this transition?
    a. Presence/relevance in the sector
    b. What are their main activities? /R strategies?
5. What differentiates SMEs from other actors in the sector?
    a. Compared to micro and large enterprises
6. In which areas do you see a need for support of SMEs?
    a. Finance
    b. Technical skills/knowledge
    c. Business operations
    d. Infrastructure development/Electricity
    e. Formalisation
7. How can this support be delivered by international actors?
    a. Finance
    b. Trade agreements
    c. Employee exchanges

Closing Questions

1. If you could change 3 things now without any obstacles to support SMEs, what would that be?

Annex D.2 Interview guideline (SME, Follow-up on online questionnaire)

Example: Participant stated to have never applied to European support before but would be interested in doing so.

Opening questions

1. What is your role in the company?

2. Could you elaborate on which equipment etc you need and thus investment for?

Main questions

3. Which financial support mechanisms from European actors are you aware of?
    a. Actor: EU, Germany, England, NL, ...
    b. Instrument: Hubs, Loans via commercial banks?, Technical assistance
    c. SME-targeted programmes?
4. Where have you heard about the financial support opportunities?
    a. Family and friends
    b. Business environment
    c. Social media
5. You indicated that you have heard about the support options but never considered it for your own company. Why?
    a.
6. What opportunities do you expect from European donors
    a. Compared to domestic ones
    b. Security/reliability
    c. Technical assistance
7. Where do see potential challenges regarding receiving financial support from European donors?
    a. Application
    b. Different expectations regarding success
    c. Reporting and monitoring
    d. Communication (pitches) and cultural differences
8. Financial requirements often differ. What kind of decision criteria would you prefer?
9. What would the ideal financial support look like for you?
10. Which alternative ways for European actors to invest can you think of?
    a. Equipment
    b. Purchasing (securing take-off of plastics)
    c. TA
11. You indicated that the owner is under 30 years old. Based on your experience, how does that impact the possibilities to access funding?
    a. What are other critical criteria that donors should target for?
12. How would you describe the transparency regarding EU finance?
    a. Accessibility of information
    b. Go to place for questions

Closing question

13. What are the 3 most important things that European donors should change when investing in waste SMEs?

Annex D.3 Interview guideline (SME, Non-participant in online questionnaire)

Opening questions

14. What is your role in the company?

Main questions

15. What do you currently need financial support for?
16. Have you ever received financial support form a European actor?

YES

1. Could you elaborate on the financial support that you have received form the European actor
    a. Organisation
    b. When
    c. Name
    d. What instrument (Payback period and Interest rate were apparently not applicable)
    e. How much
    f. What are the conditions?
2. How did you get to know about the funding?
3. Could you describe the process of applying for the funding?
    a. Via social media (Which channel? Business networks needed? Or was that a coincidence?; Accessibility?; Trustworthiness)
    b. Applied at his bank ?
    c. Bureaucratic?
    d. Go-to point for questions?
4. How was the process of receiving the loan?
    a. Transferred to bank account?
    b. In which period?
5. How did the loan cover the company's needs`?
    a. How much was not covered?
    b. Was that unexpected?
    c. Flexibility/Restrictions
6. How were the requirements linked to the loan for you?
    a. Size, formalisation, etc.
    b. develop a business and financial plan
    c. Link to TA?
    d. Follow-up requirements
7. In retrospect, what opportunities did arise for you by getting this financial support?
    a. Scaling up
    b. New employees
    c. Network
    d. TA
    e. Comparison to other financial sources
    f. Something unexpected
8. What challenges did you face?
    a. Cultural differences/expectations
    b. Language
    c. Procedures (pitching)
    d. KPIs
    e. Reliability
    f. Channel of provision
    g. Long-term dependency
    h. Something unexpected?

9. What long-term effects can you link to the funding?
10. What would you change if you were the European donor`?
    a. Using associations etc as middlemen
    b. Decision criteria (no financial criteria)
    c. Different way of financing / instrument

NO

11. Which financial support mechanisms from European actors are you aware of?
    a. Actor: EU, Germany, England, NL, ...
    b. Instrument: Hubs, Loans via commercial banks?, Technical assistance
    c. SME-targeted programmes?
12. Where have you heard about the financial support opportunities?
    a. Family and friends
    b. Business environment
    c. Social media
13. Why did you never receive finance from European donors?
    a. Not interested
    b. Too complicated
    c. I don't want to
    d. I'm not eligible
14. How would the ideal financial support look like for you?
15. What opportunities do you expect from European donors
    a. Compared to domestic ones
    b. Security/reliability
    c. Technical assistance
16. Where do see potential challenges regarding receiving financial support from European donors?
    a. Application
    b. Different expectations regarding success
    c. Reporting and monitoring
    d. Communication (pitches) and cultural differences
17. Which financial sources did you use instead?
18. How would you prefer European donors to provide financial support?
    a. Lending
    b. Purchasing (securing take-off of plastics)

Closing question

19. What are the 3 most important things that European donors are currently not considering when investing in Nigeria's SMEs?

Annex D.4 Written Interview (SME, After online questionnaire)

Dear *XXX*,

Thank you for your contribution to this questionnaire.

This questionnaire is part of a master thesis written at Utrecht University (the Netherlands). The thesis aims to identify opportunities to improve the usefulness of financial support by European

actors to Nigerian small and medium-sized enterprises (SMEs) working in plastic waste management. Based on your inputs, I aim to provide policy recommendations to European actors to support Nigeria in its sustainable development. Hence, your answers will serve to better understand

1. How European financial support is used by Nigerian SMEs and
2. The challenges for Nigerian SMEs linked to financial support from European actors.

For this research, the **definition of SMEs** is based on the one from the European Union:

- 10-149 employees (Main criteria), and
- an annual turnover between EUR2 million to EUR50 million (~ Naira 0.9 billion – 22 billion) or
- a balance sheet between EUR2 million and EUR43 million (~ Naira 0.9 billion – 19 billion).

Your answers will be treated anonymised. Besides the author of the thesis, no one will receive any data that will allow you to be identified.

If you have any questions or further information and supporting documents (e.g., figures supporting any of the answers), you can always send an email to m.biemann@students.uu.nl. Please feel free to do so.

Thank you in advance, I very much appreciate your input!

Maja Biemann

Questions

1. Please introduce yourself. (What is your name, how old are you, where are you based, what is your role in the company, ...)

Answer:

2. How many employees does Solaristique have?

Answer:

3. For what does Solaristique need financial support?

Answer:

4. Of which financial support opportunities from European actors are you aware?

Answer:

5. Where have you heard about the financial support opportunities?

Answer:

6. Did you ever receive financial support from a European actor? If so, please explain (from whom, how was is structured, how high and over which time period, what were the requirements attached to it, ...)

Answer:

7. What opportunities do you see opening up when receiving financial support from European actors? (i.e. compared to other funding sources, like friends & family or commercial banking, ...)

Answer:

8. What potential challenges regarding receiving financial support from European actors do you expect? (i.e. compared to other funding sources, like friends & family or commercial banking, ...)

Answer:

9. What long-term effects do you expect of receiving financial support from European actors?

Answer:

10. Financial donors often have to choose a limited number of companies to support. What do you consider as appropriate decision criteria to base this selection on?

Answer:

11. What would the ideal financial support look like for you?

Answer:

12. What do you think about the following support instruments for Nigerian SMEs?
    a. Provision of equipment: The European actor provides the SME with needed equipment and/or machinery.

Answer:

    b. Long-term take-off of plastics: The European actor agrees on a long-term commitment to take off a certain amount of the products produced by the SME.

Answer:

    c. Technical Assistance: The European actor organises learning programmes for SMEs. This can cover various topics from running a business to plastic-related knowledge.

Answer:

    d. Equity Financing: The European actor purchases shares of the SME.

Answer:

13. What are the three most important things that you would recommend European actors to consider when providing financial support to Nigeria's waste SMEs?
    a.
    b.
    c.

Thank you for your contribution!

Annex D.4 Interview guideline (Investor, After online questionnaire)

Opening questions

1. What are your proficiencies?

2. What current programmes cover waste SMEs?
    a. Which channels
    b. What do they finance
    c. How high is the budget?
    d. How do they finance?

Main questions

3. How do you rate the awareness among SMEs about *XXX* interventions?
    a. Communication channels
4. Which requirements must an SME fulfil to get financed?
    a. (revenue, company size, ...)
    b. Reporting
    c. Formal/informal
5. How are minority groups considered in providing financial support?
    a. Youth
    b. Women
    c. Regional
    d. Religion
    e. Informal sector
    f. Other?
6. What are the accompanying requirements related to the financial support?
    a. Application process
    b. Reporting
    c. Interest rates
    d. The support is linked to technical assistance. What does this entail?
7. *XXX* collaborates with the "*XXX*" – How does the collaboration with local partner work?
    a. Who approaches who?
    b. Who's eligible?
    c. Requirements?
    d. Reporting / controlling mechanisms
    e. Trust
    f. Corruption
8. Based on your experiences, what are challenges for SMEs when using *XXX's* finance?
    a. Motivation to start applying
    b. The application process itself (bureaucratic)
    c. Meeting the requirements (revenue, company size, ...)
    d. Business requirements (financial and business plan)
    e. Collaterals and interest rates
    f. Values and beliefs – willingness to borrow money
    g. Religion
    h. Increasing debt afterwards
9. What are the opportunities?
    a. Compared to other/local financial support (commercial bank, friends and family, revenues)
10. What are partner-specific challenges and opportunities for SMEs?
    a. Centra Bank of Nigeria

b. Micro finance
c. Training service providers

11. Which alternative financing ways would you like to try to increase the usefulness for waste SMEs?
    a. Are there any innovations planned?

Closing questions

12. How do you think does *XXX*-support impact the long-term survival chances of SMEs?

Annex E: Online Questionnaire

Financing SMEs in Nigeria

Dear participant,

Thank you for your contribution.

This survey is part of a master thesis written at Utrecht University (the Netherlands). The thesis tries to identify opportunities to improve the usefulness of financial support by the European Union to Nigerian small and medium-sized enterprises (SMEs) working in plastic waste management. Based on your inputs, I aim to provide policy recommendations to support Nigeria in its sustainable development and make them as applicable to reality as possible. Hence, this online survey serves to better understand:

1. How European financial support is used among Nigerian SMEs and
2. The challenges for Nigerian SMEs related to financial support from European donors.

The survey will take around 10 minutes.

Please answer as many questions as possible. If you do not know the answer to a specific question, you can skip that one and move on to the next.

Your answers will be treated strictly confidentially. Besides the author of the thesis, no one will receive the individual responses. Data will be used in the thesis in an aggregated and anonymised format so that answers cannot be linked to individual people.

Note that at the end of the survey, there is an option to upload supporting documents (e.g., figures supporting any of the options considered) and additional information. You can also email the documents to the contact address below. Please feel free to do so.

Any questions?

Please submit your response by **26 June 2022, 23:59**. If you have any questions, please do not hesitate to send an email to m.biemann@students.uu.nl

If you cannot finish the survey, please click “next slide” until you can send the results so that I can use the answers that you have already provided.

Thank you in advance, I very much appreciate your input!

Maja Biemann

Company insights

1. The company is based in [STATE].
2. The company was founded in the year [Textbox].
3. The owner of the company is
    a. Female
    b. Male
    c. Other If other, please specify. [Textbox].
4. The owner of the company is
    a. <= 30 years old
    b. > 30 years old
5. The staff headcount* of the company is *(Mandatory question; Answer a and d led to the end page)*
    a. 1-9
    b. 10-49
    c. 50-249
    d. ≥250

*The staff headcount includes employees, employees that are seconded to the enterprise (e.g., temporary and interim employees), owner-managers and partners deriving financial advantages from the enterprise. It does **not** include apprentices, students and employees on maternity or parental leave.

6. The core activity of the company is (Multiple options possible):
    a. Plastic waste collection
    b. Plastic waste separation
    c. Plastic waste recycling
    d. Repairing
    e. Renting products
    f. Producing materials from secondary plastics
    g. Education and advocacy
    h. Other
    i. If other, please specify: [Textbox]
7. Has your company ever received financial support from a European donor?
    a. Yes
    b. No
    c. I do not know

Yes -received funding

8. For what was the financial support needed? Please rank the following options based on relevance with 1 being the most important aspect.

	Starting the business
	Daily business operations/keep the business running
	Purchase new equipment and machinery
	Purchasing land and/or property
	Development of work-related skills and knowledge
	Paying employees
	Paying taxes

	Paying debts
	To install a company-own energy provider (like solar panels, ...)
	Marketing
	If other, please specify [Textbox]

9. From whom did your company receive the financial support from Europe? Please state the name of the donor and middleman if applicable. [Textbox]
10. What kind of financial support did your company receive from the European donor? (Multiple options possible)
    a. Loan/credit
    b. Insurance purchased by the financial intermediary
    c. Stocks purchased by the financial intermediary
    d. Land area or real estate purchased by the financial intermediary
    e. Equipment purchased by the financial intermediary
    f. Staff training paid by the financial intermediary
    g. Tax relives
    h. If other, please specify. [Textbox]
11. Please indicate to which extent you agree with the following statements:

	1 I totally disagree	2 I rather disagree	3 I rather agree	4 I totally agree	Not applicable
The application process was easy.	○	○	○	○	○
The period of time until the company received the support was as planned.	○	○	○	○	○
The amount of funding covered the company's needs.	○	○	○	○	○
The company could freely decide on what to spend the financial support on.	○	○	○	○	○
Paying the interest rate was easy.	○	○	○	○	○
The pay-back period was too short for the company.	○	○	○	○	○
The general requirements of the funding programme were difficult to meet (Company size, annual turnover, ...).	○	○	○	○	○
It was easy to develop a business plan. (A business plan provides insights on the people behind the company, how the products will be sold, why its business matters, etc)	○	○	○	○	○
I was easy to develop a financial plan. (A financial plan demonstrates the costs needed for the business and how you plan to finance them, cashflows, etc.)	○	○	○	○	○
The gender of the company's owner had no impact on receiving the funding.	○	○	○	○	○
The age of the company's owner had no impact on receiving the funding.	○	○	○	○	○
The funding programme was in line with the company's values and beliefs.	○	○	○	○	○

12. How did your company get to know about the financial support? (Multiple options possible)
    a. Social media
    b. Friends and family
    c. Governmental advertisement
    d. The European donor contacted my company
    e. Business association
    f. NGO
    g. Bank
    h. If other, please specify: [Textbox]
13. Please indicate if you agree with the following statements. In hindsight, the financial support was ...

	Yes	No	Not applicable.
...worth the effort of trying to get it.			
...helpful to engage in an additional activity that would not have happened otherwise.			
...not effective to reach the intended goal of the financial support.			
...enabling long-term planning for business development.			
...securing a stable income for the employees			
If additions, please specify. [Textbox]			

14. Did your company have to make changes in its business model or operations to be able to receive the financial support?
    a. No.
    b. Yes, namely: (please add) [Textbox]
15. Do you think your company will be able to continue its business after the financial support is exhausted?
    a. Yes.
    b. No.

From here, the participant was forwarded to question 24.

No -no funding received

16. Has your company ever applied for financial support from European donors? *[mandatory question; No was forwarded to question 21]*
    a. Yes.
    b. No.

No -no funding received but applied

17. Please indicate to which extent you agree with the following statements.

	1 I totally disagree	2 I rather disagree	3 I rather agree	4 I totally agree	Not applicable
The application process was easy.	○	○	○	○	○
The application process took too long.	○	○	○	○	○
The amount of funding offered would have been enough to cover the company's needs.	○	○	○	○	○
The company could freely decide on what to spend the financial support on.	○	○	○	○	○
The proposed interest rate was too high for the company.	○	○	○	○	○
The planned pay-back period was too short for the company.	○	○	○	○	○
The company was not able to meet the general requirements of the funding programme (Company size, annual turnover, ...).	○	○	○	○	○
The business plan did not meet the investor's expectations. (A business plan provides insights on who you are, how your products will be sold, why your business matters, etc)	○	○	○	○	○
The financial plan did not meet the investor's expectations. (A financial plan demonstrates the costs needed for your business and how you plan to finance them, cashflows, etc.)	○	○	○	○	○
The gender of the company's owner had no impact on receiving the funding.	○	○	○	○	○
The age of the company's owner had no impact on receiving the funding.	○	○	○	○	○
The funding programme was in line with the company's values and beliefs.	○	○	○	○	○
The company did not agree on the required changes in my business operations to be eligible for the funding.	○	○	○	○	○
The company found an alternative source for finance before finishing the application.	○	○	○	○	○

18. On what aspect would the company have spent the financial support it has applied for? Please rank the following options based on relevance with 1 being the most important aspect.

	Starting the business
	Daily business operations/keep the business running
	Purchase new equipment and machinery
	Purchasing land and/or property
	Development of work-related skills and knowledge
	Paying employees
	Paying taxes
	Paying debts
	To install a company-own energy provider (like solar panels, ...)
	Marketing
	If other, please specify [Textbox]

19. From which donor did your company try to receive the financial support? (Please state the name of the donor institution and middleman if applicable) [Textbox]
20. How did your company get to know about the financial support? (Multiple options possible)

	Social media
	Friends and family
	Governmental advertisement
	The European donor contacted me
	Business association
	NGO

	Bank
	If other, please specify [Textbox]

From here, the participant was forwarded to question 24.

No -no funding received and not applied

21. Would your company be interested in getting financial support from a European donor?

a. Yes.
b. No.
c. I do not know.

22. Please indicate if the following aspects contributed to your company never applying for the financial support from a European donor. (Multiple options possible)

	1 Yes.	2 No.	Not applicable.
I am not aware of the financial support provided by European actors.	○	○	○
I have heard about financial support from Europe but never considered it for my company before.	○	○	○
I do not want to ask others for money, also not for the company.	○	○	○
The company does not meet the formal requirements of European donors (Company size, being registered, ...)	○	○	○
The company cannot provide the required financial insights (business plan, financial plan, ...)	○	○	○
I expect the company to not get the financial support anyway.	○	○	○
The company cannot pay back the demanded interest rates.	○	○	○
The company cannot pay back the money in the demanded period of time.	○	○	○
My company cannot provide the demanded collaterals. (Collaterals refers to assets a company can provide to donors as security in case of loan defaults. E.g., property, machinery, ...)	○	○	○
The financial support offered does not meet the company's values or beliefs.	○	○	○
I do not trust European donors.	○	○	○
There is no need because other sources provide enough financial support (friends and family, private savings, business revenues, ...)	○	○	○
If other, please specify.	○	○	○

23. For what reasons does your company need financial support? Please rank the following options based on relevance with 1 being the most important aspect.

	Starting the business
	Daily business operations/keep the business running
	Purchase new equipment and machinery
	Purchasing land and/or property
	Development of work-related skills and knowledge
	Paying employees
	Paying taxes
	Paying debts
	To install a company-own energy provider (like solar panels, ...)

	Marketing
	If other, please specify [Textbox]

For all respondents

24. Which other source(s) did your company use? (Multiple answers possible)

	Starting up the business	Operational costs (daily business activities, salary, ...)	Purchasing new equipment	Not used at all
Private savings	☐	☐	☐	○
Friends and family	☐	☐	☐	○
Business revenues	☐	☐	☐	○
Nigerian commercial banks	☐	☐	☐	○
Crowdfunding	☐	☐	☐	○
If other, please specify.	☐	☐	☐	○

25. In which aspects in Nigeria should European investors invest? Please rank the following topics according to their relevance, with 1 being the most important. (Please place 'None' at the first place if you think they should not engage in Nigeria at all.)

	Road network
	Energy infrastructure Internet connection
	Money for companies (liquidity)
	Equipment and machinery for companies
	Curricular at universities related to sustainable plastic waste management
	Curricular in schools regarding sustainable plastic waste
	Employee training on technical and business-related topics
	Political agencies that enforce policies
	Groups or platforms to share experiences in plastic waste-related topics
	None

26. What would you recommend for European donors to increase the usefulness of their financial support? [Textbox]
27. Did the COVID-19 pandemic intensify the challenges the company faced before its outbreak?
    a. Yes, because ... (please add a short explanation) [Textbox]
    b. No, because ... (please add a short explanation) [Textbox]
28. The average annual turnover in 2019 (meaning the income during 2019) of the company was (If you don't know the answer, please estimate)

	< 900 million Naira
	900 million – <4.5 billion Naira
	4.5 billion – 22.5 billion Naira
	> 22.5 billion Naira

29. The value of the company's assets in 2019 was: (If you don't know the answer, please estimate)

	< 900 million Naira
	900 million – <4.5 billion Naira
	4.5 billion – 19 million Naira
	> 19 million Naira

30. The company is registered with a ... (Multiple options possible) (This question aims to identify the most common platform for SMEs in plastic waste management.)
    a. Governmental institution
    b. Workers' association
    c. Business platform
    d. None
    e. If other, please specify [Textbox]
31. Do you agree with potentially being contacted for a follow-up interview? (The interview could be related to further insights of your business operations, the company's financial structures or something similar. It would take max 30 minutes.)
    a. No.
    b. Yes (Please provide your email address) [Textbox]

Your responses have been registered!

Thank you for taking the time to complete the survey, your input is valuable to us.

Annex F: Elaborate challenges and opportunities for SMEs

Annex F.1: Challenges

Rare opportunities for financial support

The SMEs identified it as challenging that financial support covering their expertise or related SDGs, like plastic waste and circular economy, is rare (Interviewee 11, 05.07.2022; Interviewee 14, 18.07.2022). Accordingly, some SMEs were not aware of any European actor providing financial support to waste enterprises (Interviewee 14, 18.07.2022). Others had to apply for many other funding opportunities before being accepted by a European donor (Interviewee 11, 05.07.2022). Investors confirmed this perception by stating that the topic of waste is just recently developing in Nigeria (Interviewee 8, 30.06.2022). They struggled to identify European donors in the local waste value chain. Some business interventions were known but besides the UK and the Netherlands, European stakeholders are rarely directly involved (Interviewee 6, 30.06.2022; Interviewee 7, 30.06.2022). However, the investors rated their own programmes as fairly well-known among Nigerian SMEs (Interviewee 6, 30.06.2022; Interviewee 9, 06.07.2022, Interviewee 10, 12.07.2022).

This indicates limited opportunities for the waste SMEs to access financial support, even though it is potentially increasing. Thereby, all interviewees lacked an overview of the initiatives currently taking place. The difference in the perception of the programmes' popularity might indicate that there is a limited number of SMEs applying for multiple funding programmes whereas other SMEs are not aware of the opportunities.

Channel of the financial support

Currently, European actors rarely provide direct monetary support to SMEs. As such, one investor explained that they seek to combine aspects of both financial support and TA but mostly offer them separately. Hence, it is not guaranteed that a trained SME will also receive a loan from a financial institution (Interviewee 6, 30.06.2022). Furthermore, TA is often offered to local implementing partners that collaborate with SMEs. This entails training the implementing partner or connecting them to financial institutions which might be willed to invest in SMEs (Interviewee 6, 30.06.2022). One reason for channelling money through intermediaries might be that SMEs cannot handle large amounts of money yet. Interviewee 6 (30.06.2022) gave the example that programmes like Manufacturing Africa struggle to find enterprises capable to manage the high amount of money they want to spend. Thus, SMEs must join training programmes before and parallel to receiving financial support (Interviewee 10, 12.07.2022).

The lacking connection between capacity training and financial support implies that the current development aid is not properly aligned and thus might not be able to achieve its highest efficiency. While the support is targeted at SMEs, investors mostly channel their money towards intermediaries. This underlines the SMEs' challenge of directly accessing money and suggests that not the whole amount provided by the European actor will reach the SMEs. While the enterprises were found to be not capable of managing the money yet, training programmes predominantly address the intermediaries instead.

Application process

SMEs perceived the application step of a consent written statement on their business idea as difficult and "*odd*" (Interviewee 11, 05.07.2022). The applicants must show that they understand the problem the business attempts to address and draft a solution to it. The entrepreneurs had about one week to provide the written answers and evaluated themselves if the written text is sufficient or not. The applicants felt insecure after handing in the written interview because they did not receive a notification about the successful submission (Interviewee 11, 05.07.2022). Accordingly, the investors experienced the written statements as a major hurdle for the applicants. Nonetheless, the investors emphasised the importance of this step because the final participants joining the programme were chosen based on the most convincing business presentations and innovative ideas. One investor explained the SMEs' struggles with a lack of formal training in business skills (Interviewee 10, 12.07.2022). Additionally, most investors also involved in preparation courses considered pitching as a challenge to SMEs because its success depends on the presentation skills of the entrepreneur. This might create a gap between the SME and the investor when the entrepreneur struggles to present a business idea in the expected way (Interviewee 6, 30.06.2022; Interviewee 10, 12.07.2022). Simultaneously, the investors saw it as a skill that every entrepreneur must learn to convince potential funders. Thus, Interviewee 10 recommended the entrepreneurs get "*a partner who can be the face for the business and do the talking*." (Interviewee 10, 12.07.2022).

Therefore, SMEs seem to be challenged by concisely presenting themselves to the investors. Aspects on which they achieve training are less difficult for them, indicating effective technical assistance. Nonetheless, SMEs seem to be lacking guidance through the application process. This entails explanations of the tasks, as writing about their business idea seems to be uncommon, and an overview of the application procedure.

Eligibility criteria

Some SMEs did not apply for the funding because they expected it to be difficult or impossible to access (Interviewee 15, 10.08.2022). One male Interviewee emphasised that it is more difficult for male entrepreneurs to access funding because the current programmes predominantly focus on the youth and women entrepreneurs (Interviewee 11, 05.07.2022). Additionally, entrepreneurs were concerned that the investors might ask for bank guarantees which the SMEs could not provide. Instead, they should ask for the integrity of the owner in the company and the enterprise's production capacity (Interviewee 15, 10.08.2022). However, SMEs that have successfully applied for financial support did not perceive the entry criteria as problematic (Interviewee 11, 05.07.2022). Similarly, the investors identified that SMEs mostly do not struggle to fulfil the criteria (Interviewee 6, 30.06.2022). Currently applied eligibility measures can be divided into aspects for both the entrepreneurs and the business. For example, the entrepreneurs must have graduated from a secondary school and be literate, able to speak and read in English and be between the age of 18 and 35. Business aspects include being registered at the Nigerian Chamber of Commerce, having a bank account and addressing one of the programme's focus sectors, like renewable energy, agriculture, water, tech solutions or health. Furthermore, SMEs must have a developed business plan, preferably with a prototype, and address a local challenge and at least one SDG. Moreover, investors consider economic viability, like scaling potential (Interviewee 9, 06.07.2022; Interviewee 10, 12.07.2022). Some investors regarded these requirements as ambitious but manageable for SMEs (Interviewee 9, 06.07.2022, Interviewee 10, 12.07.2022). Others would prefer it if they would be based on alternatives to credit risks since most SMEs cannot pass the credit checks, which are also applied by commercial banks (Interviewee 8, 30.06.2022). Alternative criteria could address the business itself, like the business idea, the social

challenge addressed or external business risks (Interviewee 6, 30.06.2022; Interviewee 8, 30.06.2022). Moreover, investors added that their programmes are limited to Lagos because of already established networks in the city, the entrepreneurial spirit among the citizens and the easiness of development compared to other parts of Nigeria (Interviewee 6, 30.06.2022). An additional reason was logistics because participants were expected to join in-person activities (Interviewee 10, 12.07.2022).

This indicates entrepreneurs might expect that European support is difficult to access, which seems eventually to be unreasonable. Instead, the eligibility criteria seem to be designed to be accessible to SMEs and target underserved groups. However, traditional credit risks, not adapted to the Nigerian context, are still applied which is burdensome for SMEs. Additionally, the impact is regionally restricted to Lagos.

Size of the financial support

All SMEs perceived the received financial support as insufficient. Interviewee 14 (18.07.2022) stated that they would need nearly EUR100,000 to optimise plastic treatment. Interviewee 11 received about EUR6,000 at once from a European government. Thereby, the grant's size was set and not negotiable. Because it covered only parts of the expenses needed, the applicants also had to provide insights into how they will collect the remaining amount (Interviewee 11, 05.07.2022). From the European company, the beneficiaries received monthly financial support. Thereby, the paid amount was not enough and currently further decreasing because the intermediary is struggling to generate enough income from its own local partners (Interviewee 12, 13.07.2022). Accordingly, Interviewee 13 (14.07.2022) described it as "*a trickle in the ocean*", compared to the amount of money they need.

The investors saw this limitation as well. Regarding the expected long-term impact of the funding programme, the received amount of money was too small to secure long-term survival for most SMEs (Interviewee 10, 12.07.2022). Some programmes addressed early-stage businesses and financed the development of prototypes. However, SMEs also needed financial support afterwards to proceed. Nonetheless, the intermediary thinks that it would not be helpful to split the amount to provide continuous income over a longer period. Smaller amounts of money lose usefulness regarding purchasing power. Additionally, the highly varying exchange rates for Naira and the high domestic inflation diminish the efficiency of multiple payments. Instead, SMEs should be supported in becoming self-sustaining and able to attract follow-up funders (Interviewee 10, 12.07.2022).

These statements show that the financial support provided might be a start but is insufficient for the high financial needs inherent to the waste sector. SMEs dependend on additional income sources what is especiall challenging especially when they must prove to be able to generate enough income to cover the whole project before the European donor grants its support. Moreover, instalments should be high enough so that losses from inflation and exchange rates are bearable.

Donor's source

The donors' source of money can be a challenge as well. SMEs described that their financial support was diminishing and varied every month because the instalments depend on market forces. The returns are often lower than expected and unable to meet the company's demands regarding the beforehand agreed investment goals (Interviewee 13, 14.07.2022). Moreover, the SMEs reported that the European actor providing finance to them increasingly focuses on SMEs that clean the ocean instead of landfills. One entrepreneur found it difficult to adapt to that because generating plastic waste from the shores demands high investments in logistical structure, boats and manpower. Thus,

this business field is less interesting to companies that are not located on the coastline. Changes in the provided amount negatively affected the SME's business planning because the entrepreneur considered it in its budget and strategy planning (Interviewee 12, 13.07.2022).

This shows that donors cannot provide continuous instalments if their source of money shrinks. The sensitivity of the amount of money paid suggests that the financial support is part of a complex system. Thereby, SMEs seem to have a low impact on the drivers of change. Thus, events like shifting interests of the donor or sudden unavailability of budget lead to complications for SMEs in the long-term planning regarding business operations and development.

Inflexible agreements

The financial support has fixed requirements and deviations from the original agreement are seldom. For example, SMEs had to spend the grant exactly on what they applied for (Interviewee 11, 05.07.2022). This is challenging if external circumstances change. Interviewee 12 offered its suppliers a price/tonne-delivered depending on the current Nigerian market prices. To ensure that waste pickers receive appropriate compensation, an additional fee would be paid on top of the market price. This was supposed to be covered by the European donor. But after the SME expanded, the European actor could not pay this additional fee to all suppliers. To keep the socially beneficial prices, the SME had to either reduce the number of suppliers or buy at higher costs. However, the latter was not doable because if the processed plastic is sold for domestic market prices, the SME could not make profits. The positive impact on society could thus not be secured (Interviewee 12, 13.07.2022). Similarly, investors acknowledged that SMEs need greater flexibility and options for reconsideration when it comes to meeting agreed milestones in the funding process. Entrepreneurs should be able to reassess upcoming goals and planned purchases, for example. This is especially relevant in the unstable Nigerian context (Interviewee 9, 06.07.2022).

This indicates that the financial support is rather inflexible and loses efficiency for both the SME and its positive impacts if the recipient's needs cannot be reassessed. This impacts SMEs that face changes in their business environment and thus cannot meet beforehand agreed targets as well as well-performing SMEs that might need increasing support to accelerate their expansion. The latter touches upon the arising dependence of SMEs on financial support to stay competitive.

Long-term dependence

The investors acknowledged that not all SMEs that received grants could grow or even survive in the long term. Instead, some SMEs struggled to manage cash flows and keep liquidity afterwards. This negatively affected the organisation of payments, including salary and purchases from suppliers. To address this challenge, the intermediary provided financial consultancy but no improvements were achieved. This is expected to be caused by the unpredictable business environment, including factors like power shortages, lacking insurance and missing alternative plans (Interviewee 10, 12.07.2022). Another hurdle was keeping qualified personnel in the long term. Even though SMEs invested and trained their staff, they could not compete with the social security and wages provided by bigger companies (Interviewee 9, 06.07.2022). Lastly, the investors learned that SMEs can sometimes not survive under local market conditions. Some businesses were relocating abroad because, for example, they struggled to sell their products as society was not ready for them yet, leading to missing revenue streams (Interviewee 10, 12.07.2022).

The investors agreed that funding programmes could benefit if SMEs could be better connected to potential local follow-up funders and support facilities (Interviewee 6, 30.06.2022; Interviewee 9, 06.07.2022; Interviewee 10, 12.07.2022). For example, one organisation tried to connect the businesses to local big industry players, like Coca-Cola, via an Innovation Challenge. They consulted MNCs to identify their circular economy-related challenges to which MSMEs developed solutions. In consultation with the MNC and based on eligibility criteria, like the years of existence of the MSME, the potential waste reduction or development of workplaces and a pitch, MSMEs were selected for participation (Interviewee 6, 30.06.2022).

Thus, European support does not yet enable SMEs to self-sustain in the long term. When facing the reality of the Nigerian business environment after being supported, the SMEs seem to be not well-prepared regarding external challenges, like the business environment, market demand or competition with bigger companies.

Intermediaries

A further challenge relates to the intermediaries. SMEs preferred international NGOs to channel investments, especially compared to domestic government agencies and NGOs. The entrepreneurs worried about favouritism and personal interests in local agencies. This could lead to funding being granted to people having the right connections instead of those who would merit it (Interviewee 13, 14.07.2022). Interviewee 14 formulated more directly why European actors should choose European intermediaries, like embassyies located in Nigeria:

> "*And the issue, let me put it simply, is corruption. There might be the possibility when the EU is giving us USD100,000. And this agent, once it is not their own agent, is claiming [parts] out of that, forgetting that we are set to make impact. That is where the issue is. At the end of the day, [the agent] delivers maybe USD80,000 to us and forces us to sign that we collected all the USD100,000."* (Interviewee 14, 18.07.2022)

This underlines that SMEs face a business environment with predominant corruption. To receive to whole funding, intermediaries must be chosen carefully. Thereby, entrepreneurs trust European and international organisations more than Nigerian ones.

Currency

As touched upon earlier, high currency exchange rates are burdensome for SMEs (Interviewee 10, 12.07.2022). While SMEs prefer setting up bank accounts in the European currency (Interviewee 11, 05.07.2022; Interviewee 14, 18.07.2022), investors transferred the financial support themselves and denied a Nigerian account in the European currency (Interviewee 11, 05.07.2022).

Thus, SMEs might receive less financial support than provided because of the exchange rates to Naira despite bank accounts in Euro or Dollar are possible.

Data verification and availability

Entrepreneurs demanded to increase data verification (Interviewee 13, 14.07.2022). Thus, they would prefer their European counterparts to have an office in Nigeria. This would allow physical checks which simplify data verification and cost less time (Interviewee 12, 13.07.2022). Investors agreed that data verification is not always given. Depending on the financial facility, sometimes facts like the address of a company or demand photos of purchased machinery are checked (Interviewee 6, 30.06.2022; Interviewee 7, 30.06.2022).

Investors additionally referred to data availability. For example, SMEs are more likely eligible to participate in the programme if they cover aspects of circular economy. However, no standardised means exist to measure their impact on that. Instead, the investor demands a circular component in the SME's business model which need to be pointed out by the SME itself (Interviewee 9, 06.07.2022). Investors rated outcome assessments of programmes as difficult, especially when being not physically present in Nigeria and despite consulting local partners (Interviewee 9, 06.07.2022).

Verification procedures and performance indicators seem to lack standardisation and consistency and insufficient data availability might cause a lack of performance indicators. Furthermore, transferring the responsibility to SMEs to demonstrate their impacts on circular economy, for example, is vague and allows certain subjectivity. Additionally, SMEs must know the concept of circular economy before being able to point out to it. Thus, objective impact assessments are not possible which is especially relevant when social or environmental impacts are used as eligibility criteria or progress measurements.

Delayed payments

SMEs identified a challenge in the financial delay between operating costs and payments after delivery. As such, some SMEs depended on cash advances as a current domestic financial source. This means that the buyer gives out Local Purchase Order (LPO) Finance[6] in cash. After completing the delivery, the SME receives the balance. LPO is a common payment facility in Nigeria's waste sector. However, the agreement is trust-based and the supplier must have successfully supplied the buyer before (Interviewee 13, 14.07.2022).

This does not directly address a challenge related to financial support from Europe but it illustrates the high upfront costs needed in the waste sector. European actors should be aware of it because it is an impactful restriction on the SMEs' capabilities to run operations.

Cultural differences

Entrepreneurs indicated that the motivation of European actors to engage in Nigeria should focus more on making a social and environmental impact. As such, the SMEs hoped for greater collaboration to find solutions to climate change and wanted the investors to prioritise their impact on circular economy in their decision-making, for example (Interviewee 11, 05.07.2022; Interviewee 14 18.07.2022). Entrepreneurs wanted Europeans to be open-minded towards Nigeria's waste sector and try to understand underlying systems, especially concerning the differences to waste management in Europe. Additionally, they would like European actors to be willed to take risks and invest in the emerging waste sector. This would be especially necessary because the current recycling industry is dominated by Chinese and Indian stakeholders. If Europeans do not invest now, they might miss their chance (Interviewee 13, 14.07.2022).

[6] LPO is a funding agreement in which the buyer clarifies towards the seller the quantities of which products it wants to buy at which prices. Those material purchases can cause cash flow gaps in which the supplier does not have enough working capital available. LPO can overcome this gap by releasing money in advance. This can enable companies to accept orders for which the working capital would not sufficient. LPO is mostly rather short-term and a rather expensive financing facility. It is often provided via a specialised lender. The lender wants to collaborate with well-known organisations and demands information on the business and credit ratings. LPO is either paid directly to the supplier or provided to the buyer who can pay the balance itself. The money lent is subject to interest (SukFin, 2022).

Although the investors acknowledged that Nigeria, Lagos in particular, has one of the most developed business environments in Africa, they perceived cultural differences regarding the Nigerian business culture which was seen as "*risk-averse*" (Interviewee 9, 06.07.2022). For example, parents expect their children to find a job as a lawyer or in the government after studying. Furthermore, the educational system was not incentivising critical thinking, resulting in insufficient stimulation for innovation (Interviewee 9, 06.07.2022). Another cultural challenge was experienced during the application process when SMEs were asked for their financial needs and spending plans. The entrepreneurs stated higher monetary demands as needed because they think it is their only chance to access finance (Interviewee 6, 30.06.2022). However, there was no perception of SMEs being hesitant to accept financial support from European donors. According to the investors, entrepreneurs rather seek those investments (Interviewee 8, 30.06.2022) and perceive it as an appreciation of their business activities (Interviewee 10, 12.07.2022).

The perception of European actors having a minor focus on the projects' impacts indicates a gap between the intentions of European interventions and their realisation on the ground. Especially when money comes in, SMEs might not see it as being preliminary targeted on making a positive impact on society and the environment. However, cultural differences seem to not hamper the international exchange. Moreover, critical thinking is needed to improve the feedback for the European actors if their intervention is not appropriate for the Nigerian context.

Values and beliefs

Another cultural challenge constitutes religious attitudes. Being asked if religion constitutes a challenge for SMEs in the application process, some investors stated that religion is not considered in their funding. This was explained by the funding being based in Lagos (Interviewee 8, 30.06.2022; Interviewee 9, 06.07.2022). However, some conceded potential limitations for financial support because, for example, Islamic investments are not allowed to include interest (Interviewee 10, 06.07.2022). This can result in the financial support offered by European actors being unattractive to certain SMEs if it does not match the values and beliefs of the entrepreneur.

Alternative instrument: Foreign trade

Entrepreneurs conceded that it is difficult to survive in the market because the demand for processed plastic waste is low (Interviewee 11, 05.07.2022). Accordingly, it would be beneficial for them if the collaboration with European actors would establish international partnerships, connecting buyers and sellers, to improve the value chain (Interviewee 12. 13.07.2022). However, SMEs struggle with exporting to Europe. The international price for 1 tonne can be about three times higher than on the Nigerian market. Thus, international trade would generate much higher revenues. Nevertheless, huge investments would be needed to be able to deliver the large amounts of prepared plastic waste that would be interesting for international buyers. For example, machinery, equipment as well as space and its protection like a fence would be needed (Interviewee 12, 13.07.2022). Simultaneously, SMEs face a delayed payment structure as stressed by Interviewee 13:

> "*Many of us actually have requests a lot of times to export the plastic waste from here to European countries. But then the challenge we have is the process of exporting it. And many of these [European] companies actually want you to [...] get the materials to the port and then they pay you but it doesn't work for us here mostly*." (Interviewee 13, 14.07.2022)

Getting paid when the products are shipped or even arrive at the destination would set the SME's business activities on hold, even though the businesses and infrastructure needed to export exist. Moreover, exporting was linked to organisational hurdles. Thus, SMEs would like European actors to organise the export of plastic waste, including paper works (Interviewee 14, 18.07.2022). Additionally, SMEs criticised that they currently bear all liability and costs if something happens during the transportation to Europe (Interviewee 13, 14.07.2022). A further reason to refuse large purchases by European buyers was not feeling capable of properly managing and monitoring business. This was explained by a lack of time due to the need to have a professional job next to the waste business (Interviewee 12, 13.07.2022).

The waste sector is of low-revenue nature, reflected in the entrepreneurs' need for additional jobs. SMEs cannot survive under given domestic market conditions and solemnly financial support is not able to improve this. While SMEs appreciated the idea of take-offs creating a demand for their products, entrepreneurs were reluctant to accept large purchases from European donors. They perceive them as being linked to the expectations of good business performance from the SME. However, SMEs face an underdeveloped market and lack the money for business expansion to process plastics on large scale. The inability to invest is intensified by the delayed payments accompanying international trade. The European support mechanisms cannot provide the SMEs with sufficient stability to make them feel confident enough to bindingly agree on large take-offs from European donors. Furthermore, SMEs found international trade too risky, emphasising the need for shared responsibilities. This risk-aversion prevents SMEs from exploring international market opportunities. Moreover, if investors are not aware of this risk aversion, it could be perceived as unwillingness from the SMEs to cooperate and incapability to run a business. This can contribute to the gap between SMEs and investors and diminish the SMEs' chances of attracting finance.

Alternative instrument: Provision of equipment

So far, Nigerians rather rely on Chinese and Indian equipment because it is cheaper. If provided with European machinery, training of the local staff would be needed (Interviewee 12, 13.07.2022; Interviewee 13, 14.07.2022). Interviewee 14 underlined that European machines must match the Nigerian environment. If the standards are too high, the SME is cannot make revenues (Interviewee 14, 18.07.2022). Accordingly, the intermediary underlined that financial needs are case-specific and not all SMEs might benefit from being provided with equipment instead of money. SMEs can also be in demand for space or working capital, among others (Interviewee 10, 21.07.2022).

Thus, the provision of machinery and equipment can be beneficial in some cases. If provided, it must be linked to TA to enable Nigerians to use and maintain it.

Alternative instrument: Equity finance

Entrepreneurs would consider equity finance if it is beneficial for the SME, for example regarding human resources, financing or other valuable experiences. The Interviewee explained:

> "*The recycling industry in Nigeria is still young, is still growing. And it's still like uncharted waters, sort of. So, I need to be sure that we are able to deliver [...] before we start accepting external investments. I mean, we have to be sure [of] what we are doing so that we don't run into bankruptcy and all those kind of things.*" (Interviewee 13, 14.07.2022)

This illustrates that the entrepreneurs do not feel stabilised enough to make themselves accountable for successful business development, especially when facing Nigeria's uncertain business environment.

Annex F.2 Opportunities

Addressing the financial gap

The most obvious opportunity financial support can bring is its ability to address financial gaps. Because of the weak financial market, SMEs depend on private savings and support from friends and family (Interviewee 11, 05.07.2022; Interviewee 14, 18.07.2022). Moreover, governmental support is low. For example, Interviewee 14 (18.07.2022) reported that they won a competition run by the Lagos government. While they received a certificate, the money was still not paid yet. Investors agreed and added that a major benefit lies in their ability to reach multiple SMEs at once. This is more efficient than every SME approaching a bank for financial support separately (Interviewee 8, 30.06.2022). Nonetheless, it is acknowledged that the number of covered SMEs is small compared to the overall number in Nigeria (Interviewee 9, 06.07.2022; Interviewee 10, 12.07.2022). Moreover, investors gauged their financial support as more tailored to the SMEs' needs than other financial sources. Interest rates of 5% are softer compared to commercial banks and payback periods of two years are longer than those offered at MFIs, mostly being limited to one year (Interviewee 9, 06.07.2022). Additionally, as opposed to private financial sources, like friends and family, the agreement on payback periods and interest rates could avoid conflicts and enable SMEs to know when to expect the next instalment which allows for the planning of cash flows (Interviewee 10, 12.07.2022).

Hence, European actors can constitute an external source for the SMEs, reducing their dependence on private savings and family and friends. Thereby, SMEs can benefit from the funds explicitly tailored to them because it can reduce challenges related to Nigeria's financial market. The European support might be more accessible and affordable for SMEs than the one from a commercial bank.

Milestone-based approach

Regarding the design of the payments, SMEs preferred it step by step as opposed to one big payment. Stepwise payment would allow the donor to measure the SME's impact and can thus steer a continuous process. (Interviewee 14, 18.07.2022). Investors saw the benefits of this structure as well: "*you know how they say: What is not measured is not done? Is it easier for people to stay on track when they know you are going to come back and ask them for [reports]*" (Interviewee 10, 12.07.2022). This indicates that the milestones force the SMEs to progress. The milestones structure the investment by splitting the total amount into instalments. For example, SMEs received one instalment every six months over two years. For each payment, they must have repaid the previous loan proportion and met the beforehand agreed sub-targets, such as purchasing specific equipment. Additionally, the SMEs must provide financial reports quarterly. To receive the next amount, the loan payback is a fixed requirement whereas other aspects, like the payback period, can be adjusted to the changing environments of the SME. The need for flexibility became especially clear during the COVID-19 pandemic (Interviewee 9, 06.07.2022; Interviewee 10, 12.07.2022). When failing, SMEs have not had to reimburse the provided support. However, investors reached out to them to derive learnings (Interviewee 10, 12.07.2022).

Milestone-based financial support was appreciated by both SMEs and investors. It fosters SMEs to progress, keep track of their business activities and allows for feedback moments. Additionally, investors can avoid wasting money because they can stop payments when repayment and milestones cannot be kept. Having said that, sufficient flexibility must be given to adjusting to changes in the SMEs' ecosystem.

Similar application processes

The application processes for SMEs were predominantly similar to each other, mostly including a pitching moment. SMEs that had to provide a video introduction stated to be not challenged by this (Interviewee 11, 05.07.2022). Furthermore, SMEs benefitted from the similar procedures because previously written texts could be reused: "*you have to understand what each person wants and try to narrate your idea or your project down to [that]*." (Interviewee 11, 05.07.2022). As such, SMEs felt prepared to apply for financial support since they already prepared a pitch deck (Interviewee 14, 18.07.2022).

This indicates that the application process is not perceived as too difficult by SMEs, considering that this was mostly stated by SMEs that already managed to receive funding. However, this shows that entrepreneurs realised that investors often have a focus that should be covered in the application. Applications seem to become easier the more familiar an entrepreneur is with sustainability topics, and thus, able to identify the focus of the European donor. Applications could become easier when entrepreneurs participate more often in application processes.

Increasing purchasing power

Financial support can enable SMEs to address various needs. This can entail the procurement of materials and equipment (Interviewee 11, 05.07.2022; Interviewee 13, 14.07.2022; Interviewee 14, 18.07.2022), technology (Interviewee 14, 18.07.2022) as well as logistical aspects and vehicles (Interviewee 13, 14.07.2022; Interviewee 14, 18.07.2022). The money allowed for business expansion that can increase companies' capabilities to manage the increasing supply of waste plastics (Interviewee 13, 14.07.2022, Interviewee 15, 10.08.2022). Additionally, the money can be used to incentivize Nigerians to improve their waste disposal behaviour (Interviewee 14, 18.07.2022). Even if the SMEs received minor amounts, it helped to meet smaller needs, like paying employees and buying personal protective equipment (PPE) (Interviewee 13, 14.07.2022, Interviewee 15, 10.08.2022). Investors found the money to enable SMEs to develop and improve prototypes of their business idea, afford office spaces and get legal advice. It helped SMEs to increase and standardise production (Interviewee 9, 06.07.2022; Interviewee 10, 12.07.2022).

This illustrates that the additional money can support capital-intensive purchases which could not have been afforded otherwise. Even smaller amounts are acknowledged, especially to secure a monthly income for the entrepreneurs or the employees.

Increasing employment

Alongside increasing purchasing power, investors reported that by funding 30 cross-sector entrepreneurs, 200 full-time jobs and 271 part-time jobs were newly created and about 260 already existing full and part-time jobs were supported, respectively. Out of the total, women accounted for 129 workplaces. The participation rate of women in the funding programme itself was 45%. The investor stressed that gender equality remains a focal point that demands continuous attention (Interviewee 9, 06.07.2022). This supports the more general finding that SMEs have a positive impact on Nigeria's GDP and address societal needs, for which proofing data is missing (Interviewee 10, 12.07.2022).

The financial support can allow SMEs to expand their businesses and thereby accelerate the development of Nigeria's economy. By providing additional workplaces, a positive impact on society can be generated.

Guided business development

SMEs experienced opportunities additional to increasing liquidity. In comparison to other funding sources, Interviewee 11 emphasised:

> "*Someone could give you a million dollars and if you don't know how to [use it], you could lose it within three months, [or] even in a shorter time. But when someone [...], even if it's USD500, is able to guide you, able to link you with other [...] key persons that you need, it becomes more advantageous than even the money that was implemented. So, basically for me, aside the money, it's the other things that come with it.*" (Interviewee 11, 05.07.2022)

Financial support was often linked to mentorship programmes, guiding business development. Those took mostly about six months and started before receiving the money. Thereby, SMEs got paired with a mentor who evaluated if the enterprise met the goals set at the beginning of the programme and assisted where needed. The feedback was based on periodical progress reports delivered by the SME. Often, SMEs have never written a report like this before and thus had to learn how to disclose specific milestones and KPIs. These can be plastic-related figures, for example, the input material gathered, the machines that they purchased due to the financial support or other business processes (Interviewee 11, 05.07.2022). Preferably, the workshops would address topics relevant to business upscaling. Thereby, it should be especially focused on how to handle incoming external investments to gain beneficial outcomes for both parties (Interviewee 14, 18.07.2022). Investors rated the training and capacity building often linked to the financial support as a major benefit compared to receiving finance from family and friends and a '*richer package'* (Interviewee 10, 12.07.2022). The effectiveness could be reflected in the European-based Investor perceiving the level of pitching as high and considering Nigerian entrepreneurs as comfortable speaking in front of a group. The Interviewee stressed its involvement in the application process only during the pitching event and that the training process prior to the financial support might be focused on developing pitching skills (Interviewee 9, 06.07.2022). Furthermore, the investors recognised positive feedback from some SMEs placing their previous mentors on their company board (Interviewee 10, 12.07.2022). However, they also accredited that the provided technical assistance should be further tailored to the SME's needs (Interviewee 9, 06.07.2022).

This underlines that both parties, investors and SMEs, consider accompanying TA as important for SMEs. It can teach how to manage the increased liquidity and several business-related skills. This sharing of company insights also allows external consultancy. Input on plastic-specific topics seems to be lacking so far.

Data assessment

SMEs valued the kind of data the European actors demanded. During the application process, SMEs were asked for the monthly collection rate, the business strategy and the company's social impact (Interviewee 13, 14.07.2022). Others had to be innovative businesses addressing climate-related SDGs (Interviewee 11, 05.07.2022). Especially the interest in the SME's social impact was not a difficult requirement when the SME was already running an NGO (Interviewee 13, 14.07.2022). Data collection during the funding was also positively experienced. Via a simple application on the phone or laptop, SMEs reported on the source and volume of plastic waste received, processed and sold. This was verified by uploading photos (Interviewee 12, 13.07.2022). This helped solve logistical problems (Interviewee 12, 13.07.2022) and simplified record keeping (Interviewee 13, 14.07.2022). It also supported the verification of achieved milestones, for example, via photos, contracts or site visits (Interviewee 10, 12.07.2022). Additionally, European actors were interested in the number of waste

pickers and the gender composition (Interviewee 13, 14.07.2022). Thereby, the funder's approach of asking for accumulated data was acknowledged (Interviewee 14, 18.07.2022). As stated by Interviewee 13:

> "*Because we work a lot with informal collectors, we might not be able to keep tabs on dashboards. We can do monthly, we can do quarterly, because then we are able to accumulate [the] data we have to gather. So that will make sense for us. And, for example right now, they ask for the number of collectors that collect a certain amount of waste. That's doable, but when you start asking for the names, the phone numbers, email addresses, some of these guys don't have phone numbers, some of them don't have emails.*" (Interviewee 13, 14.07.2022).

This shows that European donors apply measurements that are adapted to the Nigerian context. Additionally, due to mandatory reporting, SMEs benefitted from improving data monitoring, processing and organisation. Data collection demanded by the European actor can force SMEs to gather and structure business insights which are also helpful for them in the long term to improve business planning.

Stabilised income

Further positive impacts on businesses in the long term were perceived because investments supported SMEs in gaining traction (Interviewee 11, 05.07.2022). For example, it could provide stability in staffing in the long term (Interviewee 13, 14.07.2022, Interviewee 15, 10.08.2022). Investors found that financial support can enable entrepreneurs to focus on business development by securing a monthly income. Waste SMEs often do not generate enough profits to earn a living. Hence, a monthly allowance can reduce the need for entrepreneurs to work alongside the waste business (Interviewee 9, 06.07.2022; Interviewee 10, 12.07.2022).

This shows that SMEs require improving long-term planning. By contributing a monthly income, the financial support might secure some stability which allows entrepreneurs and employees to fully focus on the waste enterprise.

Networking

SMEs appreciated the networking aspect accompanying the financial support. First, they met other participants during the mentorship. This was perceived as a welcome opportunity for peer learning because they often faced the same challenges (Interviewee 11, 05.07.2022). Second, SMEs benefitted from international networks. This included being able to present their business idea at topic-related conferences and meeting experts in the field of interest (Interviewee 11, 05.07.2022; Interviewee 12, 13.07.2022). Moreover, European actors sometimes provided a marketplace in which the SME can sell products and search for potential foreign customers (Interviewee 13, 14.07.2022). This could meet the SMEs' hopes for expanding exports (Interviewee 15, 10.08.2022). These networks should also be used for increasing mutual knowledge sharing between the donor country and Nigeria (Interviewee 10, 21.07.2022).

The European networks provide SMEs with opportunities for knowledge sharing and business activities that go beyond Nigeria. Since SMEs can also speak at conferences, it can be assumed that the knowledge is shared in both directions.

Improving reputation

Entrepreneurs valued the reputational benefits their company gained when participating in European programmes (Interviewee 11, 05.07.2022; Interviewee 13, 14.07.2022). The financial support indirectly opened new business opportunities:

> "*The sector in Nigeria is too small. Information flies around quickly. So, we got into a programme funded by the Coca-Cola Foundation recently, and I think part of why we were selected was because we are already on this [European] programme."* (Interviewee 13, 14.07.2022).

Thus, participating in European programmes might simplify the access to other Nigeria-based programmes.

Investors also recognised positive external impacts of their programmes. They reported on the increasing popularity and revenues of participants. SMEs achieved local approval to sell their products and expanded to the UK, the US or Canada. Furthermore, receiving financial support improved the SMEs' reputation and credibility, resulting in greater attractiveness for follow-up investments and finance from the market (Interviewee 9, 06.07.2022; Interviewee 10, 12.07.2022).

This indicates that European support has a sustaining positive impact on SMEs, for example through greater interest from third parties of the financial market, business partners, customers and legal entities.

Digitalisation

SMEs appreciated that most aspects of the support programmes happen online. This was related to the application process, communication, data verification (Interviewee 13, 14.07.2022) or mentorships and workshops (Interviewee 11, 05.07.2022). Furthermore, digital banking simplified international money transfers, especially since SMEs can open domiciliary accounts in Nigeria (Interviewee 14, 18.07.2022). Accordingly, investors reported high participation in the first step in the application process, signing up via a Google form (Interviewee 6, 30.06.2022; Interviewee 10, 12.07.2022).

Digitalisation facilitates the connection of European donors with Nigerian SMEs. Both parties experienced it as simplifying the processes. However, it must be considered that this research was also conducted online and thus stakeholders without digital access were not considered.

Easy communication

The SMEs rated the communication with the donors as convenient. They got to know about the opportunities for financial support from Europe via the Recyclers Association of Nigeria (RAN) in which they are members (Interviewee 12, 13.07.2022; Interviewee 13, 14.07.2022) or through social media (Interviewee 15, 10.08.2022). The latter worked, for example. via an advertisement on Twitter, even though the entrepreneur did not follow the European actor back then (Interviewee 11, 05.07.2022). Afterwards, they communicated with the European actor via WhatsApp and email. Language is no barrier (Interviewee 13, 14.07.2022). Furthermore, the donor was positively recognised as proactive, following up with calls if the SME did not reply to an email (Interviewee 11, 05.07.2022). In one case, the European actor reached out to the SME again after an unsuccessful application the year before, without them applying again (Interviewee 11, 05.07.2022). Additionally, the donors were open to integrating feedback provided by SMEs (Interviewee 12, 13.07.2022). Feedback between intermediary and donor was also perceived as good. The intermediary had enough flexibility to structure the

programme. They presented the budget planning to the European donor who reviewed it and gave its approval after a few adjustments (Interviewee 10, 21.07.2022).

This shows that advertising the support programmes via both networks and social media, thus offline and online, is appropriate to reach SMEs. Furthermore, SMEs liked the relationship between SMEs and European actors during the support programme, also regarding the donors' proactiveness.

Trends in Europe

Waste SMEs can benefit from recent developments in Europe. One investor indicated that contacts within the field of circular economy and expected changes in the European country's government led to attributing higher importance to circular economy in projects in Nigeria (Interviewee 6, 30.06.2022). Additionally, the financial support sought to mainstream covering underserved parts of the population. These included women and the youth as well as early-stage businesses, mostly considered high-risk enterprises (Interviewee 8, 30.06.2022; Interviewee 9, 06.07.2022).

Thus, if properly implemented, current developments in Europe towards greater sustainability can be beneficial for SMEs because the European actors try to include those in their international activities.

Availability of different instruments

The preferred structure of the support mechanism varied among SMEs. Some enterprises were preliminary searching for grants because they fit better to the capital-intensive but low-return nature of the sector. Long-term loans were the second-most preferred option. Those should have payback periods between 5 to 10 years and low interest rates between 3 to 5%. Furthermore, TA linked to financial support was desired (Interviewee 13, 14.07.2022). Accordingly, other entrepreneurs preferred money for operational costs because it is needed to run the machines at their optimum (Interviewee 14, 18.07.2022). Other SMEs saw clear benefits in being provided with non-monetary support:

> "*I prefer equipment, I don't even want money. I prefer the equipment and then see the value that the equipment is bringing. [...] I want to be accountable for anything. [...] Bring the equipment [...] for crushing. And linking those big international companies who need my products to buy up whatever I produce [...]. So, it is a win-win. You're interested in the market for the feedstock. I'm also interested in pulling more feedstocks.*" (Interviewee 12, 13.07.2022)

This indicates that preferences highly depend on the SME's needs. Some preferred monetary support, however, linked to TA. Others thought that money is accompanied by expectations regarding their business performance and thus preferred non-monetary support.

Alternative instrument: Provision of equipment

Entrepreneurs would be open to considering machinery provided by a European actor because they currently depend on Chinese equipment which is accompanied by frequent maintenance and downtimes. Thus, getting provided with the more expensive European machinery was perceived as a "*big win*" for the SME (Interviewee 13, 14.07.2022; Interviewee 15, 10.08.2022). Employees were expected to be able to handle European machinery if they would receive training on it (Interviewee 13, 14.07.2022). Investors expected leasing to be an opportunity to promote foreign investments in Nigeria. This could be accelerated by inaugurating an equipment leasing regulatory authority (Interviewee 8, 30.06.2022).

Receiving European equipment could overcome the high upfront costs SMEs face when purchasing equipment. Currently, SMEs predominantly rely on the lower-price but also lower-quality equipment from China and India. Leasing could overcome the SMEs' inability to afford the machines.

Alternative instrument: Internships

Entrepreneurs hoped for the opportunity for one of the employees to do an internship in a recycling company in Europe. For example regarding European machinery, the staff can understand the technology by reading manuals and maybe getting support via video calls. However, great potential was expected in experiencing how both daily business and waste management are done in Europe (Interviewee 14, 18.07.2022). This shows that some entrepreneurs are willing to learn how other countries do business and manage waste.

Alternative instrument: Equity finance

Most SMEs would consider equity finance as an option if it brings benefits for the SME as well (Interviewee 15, 10.08.2022). To improve the financial support, investors considered crowdfunding (Interviewee 8, 06.07.2022), impact investments and equity financing as alternatives that potentially increase the funding's long-term impact. When businesses grow, investors would earn dividends or pay-outs in case of takeovers. These can be re-invested into further SMEs and could decrease the dependence of public investors on budgets provided by the government (Interviewee 10, 12.07.2022).

Reinvesting revenues generated from successful financial support could expand the support's impact because it can reinvest generated income.

Alternative instrument: Foreign trade

The intermediary was convinced by the idea that European actors commit to long-term purchases of the SMEs' products. This could encourage SMEs that try to connect to large Nigerian and European companies to address the important challenge of insufficient access to markets (Interviewee 10, 21.07.2022). To overcome the challenge of delayed payments linked to foreign trade, investors saw potential in international factoring[7]. This was recently launched in Africa by FCI to address this challenge. However, the related regulatory framework must still be developed and is decisive for the interest of European actors in it (Interviewee 8, 30.06.2022). This illustrates that different to SMEs, the investors see the benefits of international trade. European actors could increase the demand for the SMEs' products.

[7] International factoring is offered by FCI, the global representative body for the Factoring and Receivables Finance Industry (FCI, n.d.-a). The organisation wants to ease international trade by providing factoring across borders. This means that FCI provides a credit to the purchasing actor for paying the bills of the exporting enterprise. Hence, the exporting country is protected against delays in the buyer's payment and the buyer can Recycling can create a value chain and thus address the insufficient formal service provision and secure an income for informal waste pickers, provide manufacturing companies with input materials and help to clean up the plastic waste that is already discarded in the environment. more comfortably transfer the money in its own currency and language, for example (FCI, n.d.-b).