Waste as a resource – Opportunities in Africa

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ABSTRACT

It is estimated that 125 million tonnes of municipal solid waste is generated in Africa, of which only about 68 million tonnes are collected. Unsanitary landfilling and open dumping of the collected waste is the predominant waste disposal option in many African countries. Opportunities in Africa to develop a secondary waste economy are still largely unexplored. Trade in recycled materials is growing rapidly and the recycling market is becoming increasingly globalised. The recent notice to the World Trade Organisation (WTO) by China to ban imports of certain waste streams by the end of 2017 (WTO 2017) potentially has huge implications, including job losses in the recycling industry, especially for countries that do not have their own processing facilities. This ban by China, may however also create an opportunity for Africa to develop local markets and processing facilities for recyclables.

This paper explores the opportunities created by the China ban for developing a secondary waste economy in Africa. The emphasis is on identifying opportunities that will realise the benefits on the African continent, rather than abroad through the export of materials.

KEYWORDS

Municipal solid waste, secondary resources economy, circular economy, value of waste

INTRODUCTION

It is estimated that about 125 million tonnes of municipal solid waste (MSW) is generated in Africa per annum and that little more than half of this waste (68 million tonnes) is collected (Scarlat et al., 2015). The collection rates vary depending on the income level of the country and by the region. High income countries have collection rates averaging 98 per cent while in low income countries the average rate is 40 per cent. In Lesotho, a low income country, only 7 per cent of urban households have access to waste collection services (Simelane and Mohee, 2012). The collection rates in Northern Africa are also significantly higher than in sub-Saharan Africa (Scarlat et al., 2015). The collection coverage for household waste collection in African countries range between 25 to 70 per cent (UNEP, 2015). Therefore, open dumping with burning and unsanitary landfilling remains the predominant waste management method in Africa (Simelane and Mohee, 2015). UNEP (2015) identified 19 dumpsites in Africa as being amongst the world's 50 biggest dumpsites (Figure 1). These dumpsites are defined as landfills lacking proper liners, leachate and gas management systems, anti-flooding measures and sound operations (UNEP, 2015). The waste generation rate for municipal solid waste in Africa is estimated to be 0.65 kilogram per person per day (varying between 0.09 and 3.0 kilogram per person per day) and is expected to increase to 0.85 kilogram per person per day in 2025. This translates into 169 119 tonnes of waste generated on the African content per day in 2012 and 441 840 tonnes per day in 2025.

Figure 1: The location of the 19 biggest dumpsites in Africa (UNEP, 2015).

The per capita waste generation rates vary considerably across countries, between cities and even within cities (Hoornweg and Bhada-Tata, 2012). Waste generation is generally lower in rural areas since, on average, rural residents are generally poorer, purchase fewer products from stores, and therefore generate less packaging waste and are more likely to re-use items and

compost garden and food waste (Hoornweg and Bhada-Tata, 2012). The rapid waste generation growth rate in Africa (30 percent between 2012 and 2025) is largely driven by urbanization and an increase in socio-economic status coupled with higher disposable incomes. This growth in waste generation is not expected to stabilize before 2100 (Hoornweg et al, 2015).

Waste collection and infrastructure services in urban areas are generally provided by municipalities throughout Africa (UN-Habitat, 2010), but municipalities often lack the technical and financial capacity to provide efficient and effective services to all residents (McAllister, 2015), as is evident from the low collection coverage rates. The private sector is generally better placed to provide waste services at a lower cost than municipalities (Imam et al, 2008), but only to those that are in a position to pay for the service. Other actors such as business, civil society and the informal sector also help to strengthen the governance capacity to manage waste in Africa (Wingqvist and Slunge, 2013).

The composition of waste generated also differs between countries in that the organic waste fraction tends to be highest in low income countries and lowest in high income countries (Hoornweg and Bhada-Tata, 2012). The change in waste composition should be interpreted with care, however. The literature suggests that there is an increase in overall waste generation (including both organic and non-organic waste) as income rises; but that the organic fraction increases at a slower rate than the non-organic fraction; such that there is a shift in the overall composition toward non-organic waste as income increases. As such, in low income countries, organic waste makes up 64% of the overall waste composition, compared to 28% in high income countries (Hoornweg and Bhada-Tata, 2012). The waste composition by country income level is presented in Figure 2.

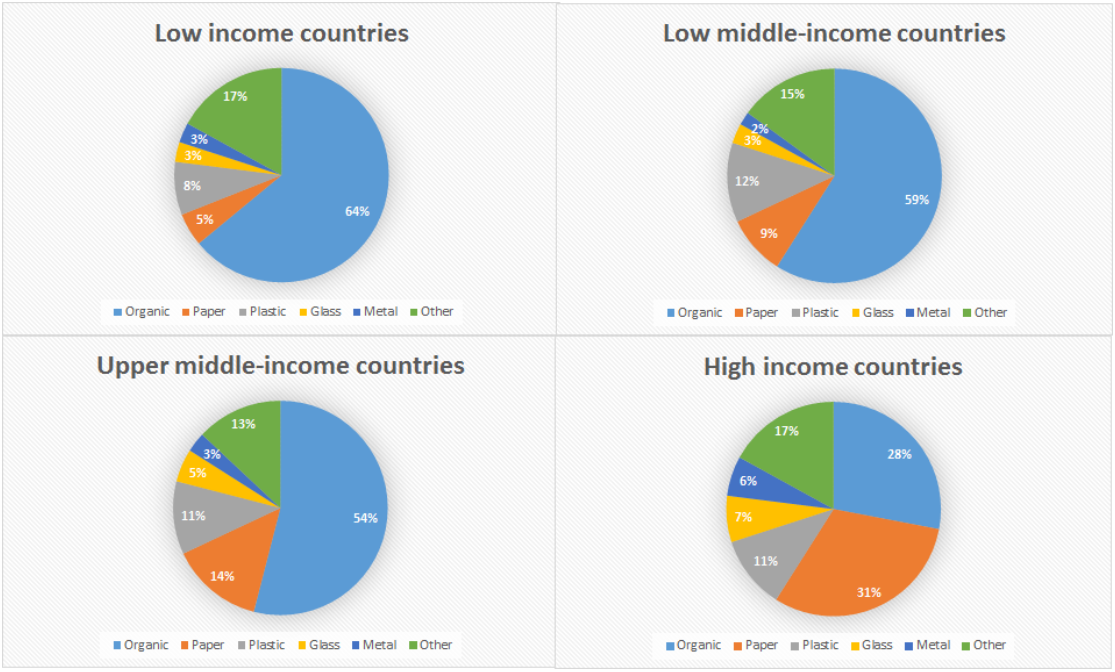
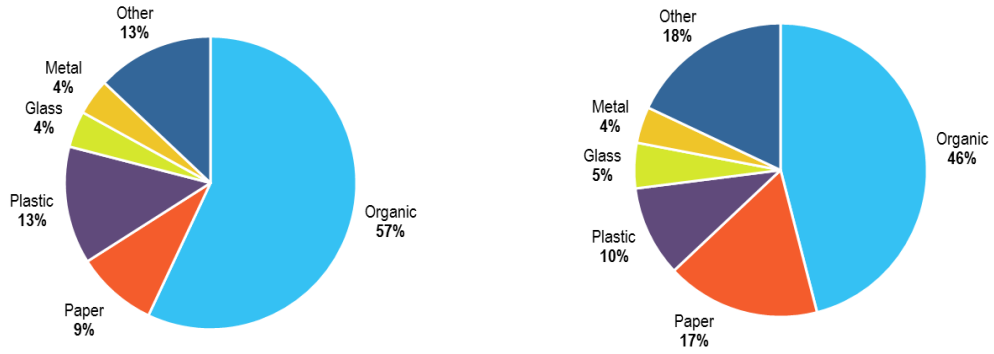


Figure 2: Waste composition by income (Hoornweg and Bhada-Tata, 2012)

When comparing the overall waste composition from sub-Saharan Africa with that of the rest of the world (Figure 3) it is therefore evident that MSW in Africa is not all that different. The MSW generated in Africa is therefore likely to have value as secondary resources. The aim of this paper is to identify the opportunities for a secondary waste economy in Africa. Will the implementation

of the waste hierarchy be enough, or should the focus change to the implementation of the circular economy?



[A] Sub-Saharan Africa MSW composition [B] Global MSW composition

Figure 3. MSW composition for sub-Saharan Africa [A] compared to global composition [B] (Hoornweg and Bhada-Tata, 2012)

WASTE HIERARCHY VS THE CIRCULAR ECONOMY

Globally, the waste sector is undergoing a paradigm shift towards a 'circular economy' where 'waste' is viewed as a 'secondary resource', not only for energy recovery, but also for re-use, recycling and recovery of materials. The circular economy "*seeks to maximise the longevity of resources by retaining them in a closed loop for as long as possible*" (UNTHA UK, 2015). In contrast, the waste hierarchy provides a set of priorities for the efficient use of resources (UNTHA UK, 2015). It is reported that the waste hierarchy is easy to interpret, even for non-waste expert; it provides clarity on the actions and behaviours that should be prioritised; and it is something that businesses, people and a country can easily commit to (UNTHA UK, 2015). The circular economy, on the other hand, is more aspirational; requiring fundamental changes to the way in which businesses operate. It requires more expertise, effort and planning to establish a closed loop system as envisaged by a circular economy; and it also requires a more collaborative approach, with involvement of the private sector being critical (UNTHA UK, 2015). The circular economy is increasingly receiving attention as a way to overcome resource limitations by decoupling global economic development from consumption of finite resources (Ellen MacArthur Foundation, 2015).

Globally, there are examples of the circular economy approach being successfully implemented (UNTHA UK, 2015). For example, environmental service providers such as Veolia and SITA have moved from being resource operators, to manufacturing companies (UNTHA UK, 2015). It is therefore clear that the circular economy and the waste hierarchy are complementary approaches providing many opportunities for Africa.

OPPORTUNITIES FOR AFRICA

There are a range of benefits associated with moving waste up the waste management hierarchy (EEA 2011; UNEP 2013; DST 2014), including, among others –

- Waste minimisation, reuse and recycling all reduce the social and environmental costs ('externalities') associated with landfill disposal (such as health hazards, odours, visual impacts, contamination of soil and water resources, emissions of greenhouse gases, reduced land availability and value, etc.);
- Waste minimisation and re-use can reduce the financial, social and environmental costs associated with both waste collection and disposal; hence their place at the top of the waste management hierarchy;
- Recycling and energy recovery contribute to economic growth and job creation, and can also foster innovation and create new business opportunities;
- Recycling and energy recovery allow for valuable materials or energy to be recovered and recirculated back into the economy. These materials can in turn be used as inputs in manufacturing of new products; and
- Recycling and energy recovery displace the use of virgin materials, and therefore reduce the financial, social and environmental costs associated with virgin material extraction.

Alternative uses for waste convert secondary materials into valuable assets, including compost, new products and energy (Simelane and Mohee, 2015). Implementing the waste hierarchy and adopting alternative use technologies in Africa are thus desirable to address the waste management challenges as outlined above, but also to unlock the potential opportunities in waste for economic growth, job creation and improved livelihoods (Oelofse *et al*., 2018). The benefit of unlocking this potential can further be maximised through the selection of the most appropriate technologies, in line with the principles of the circular economy (Ellen MacArthur Foundation, 2015), namely:

- Preserve and enhance natural capital;
- Optimise resource yields; and
- Foster system effectiveness.

However, to attain this, a number of challenges will have to be resolved first (Oelofse et al., 2018). The current waste collection and disposal systems in Africa need to be improved and expanded to address backlogs in service delivery. It also requires bridging the waste service chain with private sector value chains to divert waste towards value-add opportunities, as illustrated in Figure 4. This will improve the living conditions of affected communities while capturing and making secondary resources available for conversion into assets. Another challenge is the perceived higher cost of alternative treatment technology relative to landfilling (DST, 2014). This current lack of effective waste collection and management systems, coupled with the lack of treatment capacity supported by appropriate technologies, means that the opportunities for secondary resource use in Africa is currently limited (Oelofse et al., 2018). To realise the potential of waste in Africa, it is important to understand the resource value of the materials and to create an enabling governance environment to attract investment.

The following section looks at the potential economic value of the waste that could be realised and fed back into the economy.

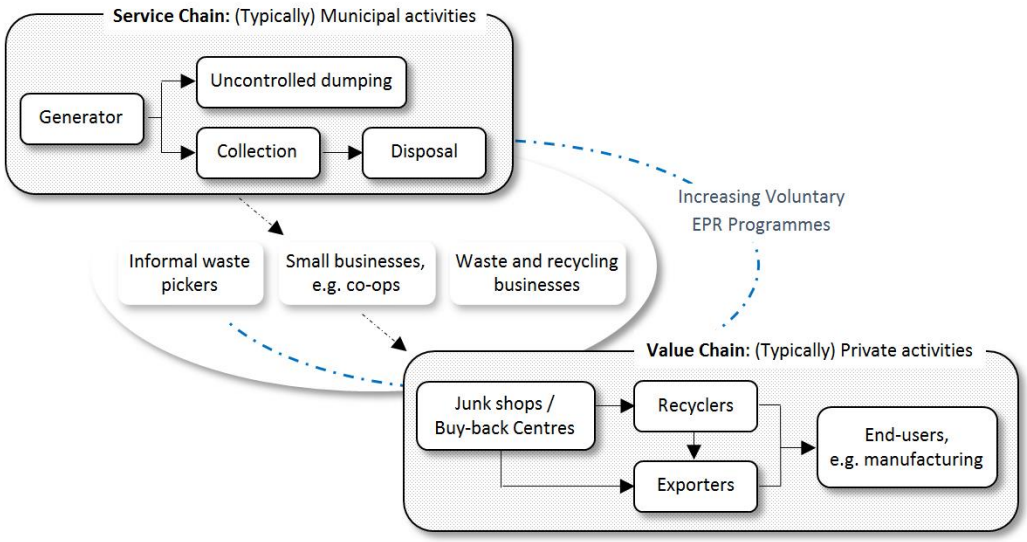


Figure 4: Bridging the service- and value-chains in unlocking opportunities in Africa (Oelofse et al., 2018).

Economic value of waste as a resource

Oelofse *et al*. (2018) quantified the resource value of waste in Africa as nearly US$8 billion per year, of which US$7.6 billion worth of valuable resources (96 per cent) is currently lost through the disposal of waste each year (Table 1). Considering that a living wage for a family in South Africa is set at US$ 813 (R10 300 at an exchange rate of R12.67=US$1) per month (Trading Economics, 2018), the value locked in MSW in Africa alone could pay a monthly living wage to just over 800 000 households per year (at South African living wages). However, this should be seen as a conservative estimate as it is based on only MSW generated in urban areas, and for a limited number of waste types and it is a direct estimate of the value of the waste as resource (i.e. the price paid by the recyclers for input material). The final value of the waste after value adding processes could be significantly more.

Unlocking the economic value of waste will also create social opportunities as discussed in the next section.

Table 1. Resource values per waste stream (based on MSW generated in Africa) (adapted from Oelofse et al., 2018)

	Waste generation	Unit values, US$ per tonne	Total resource value, US$ per year			
	Tonne per annum		Status Quo 4% Recovery	Scenario 2: 25% Recovery	Scenario 3: 50% Recovery	Scenario 4: 100% Recovery
Organic	71 246 580	16.28	46 395 773	289 973 581	579 947 161	1 159 894 322
Paper	11 249 460	64.26	28 915 612	180 722 575	361 445 150	722 890 300
Glass	4 999 760	42.30	8 459 594	52 872 462	105 744 924	211 489 848
Plastic	16 249 220	269.28	175 023 598	1 093 897 490	2 187 794 981	4 375 589 962
Metals	4 999 760	195.95	39 188 119	244 925 743	489 851 486	979 702 972
Other	16 249 220	31.71	20 610 511	128 815 692	257 631 383	515 262 766

Total	124 994 000	-	318 593 207	1 991 207 542	3 982 415 085	7 964 830 170
Increase relative to status quo		-	-	1 672 614 336	3 663 821 878	7 646 236 963

Social opportunities

According to the latest estimates of the World Bank, poverty in Africa declined from 57% in 1990 to 43% in 2012 (Beegle et al., 2016). Although this seems to be good news, in reality the number of people in Africa living in poverty increased by more than 100 million due to population growth. It is further projected that the extreme poor of the world will be increasingly concentrated in Africa (Beegle et al., 2016).

The average annual income in Sub-Saharan Africa is US$2,041, or US$5.60 per day. For comparison, the EU annual income is about US$27,555 (app. €20,794) which is 13 times as much. Furthermore, this income is unevenly distributed with 73% of Sub-Saharan Africans living on less than US$2 per day, and 51% on as little as US$1.25 per day. Overall, the rural population is hit much harder by poverty than people living in urban areas, which is one of the reasons for rural to urban migration being prevalent in sub-Saharan Africa (Global Growing, 2014).

The social opportunities associated with moving waste up the hierarchy include poverty alleviation, empowerment of women, job creation, entrepreneur development and enterprise creation, amongst others (Oelofse et al., 2018). The secondary resources economy has grown into a global business (Hoornweg and Bhada-Tata, 2012), with China and India at the forefront of realising these opportunities through the creation of processing facilities (Fakir, 2009).

Impacts of China ban on imports

China recently issued a notice to the World Trade Organization that it intends to ban imports of certain waste streams by the end of 2017 (WTO 2017). This ban had serious negative consequences for many countries exporting secondary resources, including job losses in the recycling industry, especially for countries that do not have their own local processing facilities as well as a drop in the price being paid for secondary resources (Oelofse et al., 2018).

This ban by China may, however, also create an opportunity for Africa to develop local markets and processing facilities for recyclables, thereby creating some resilience to global shocks in the secondary resources market. The China ban may therefore be a blessing in disguise as it opens the door for the development of local processing capacity for secondary resources in Africa. This development opportunity should, however, be approached from a regional perspective to ensure economies of scale. Care should be taken to attract reputable investors with ethical business practices to ensure that this development contributes to social upliftment, creation of decent jobs and sustainable development in Africa for the people of Africa.

Furthermore, there is a risk that foreign investment could lead to the implementation of technologies that are not necessarily suited to local African conditions. There is thus an opportunity for local experts to influence technology choices, develop new innovative technologies for waste streams that are not yet included in the secondary resources economy, and for innovative customisation of off-the-shelf technologies to local conditions.

CONCLUSIONS AND RECOMMENDATIONS

The current overall state of waste management in Africa is poor and, at first glance, not conducive to implementing the waste hierarchy. However, the projected growth in waste generation and people living in poverty require action to improve waste management on the continent. In addition, the opportunities locked in waste as a valuable resource, needs to be realised for the benefit of Africa and its people.

The waste hierarchy has stood the test of time and should therefore be promoted throughout Africa. The people of Africa are at risk as a result of poor waste management practices and implementing the hierarchy could improve their health, livelihoods and the state of the environment in which they live. The development of a secondary resources economy holds promise to create much needed jobs and revenue opportunities for Africa provided that these opportunities are realised on African soil.

The China ban have opened a number of opportunities in Africa, but there is a risk that these opportunities could be exploited to the detriment of Africa and its people, if not properly managed. The onus is therefore on African governments to work together to ensure that these opportunities are indeed realised but for the benefit of Africa and all its people.

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