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# Value Chain Actors and Recycled Polymer Products in Lagos Metropolis: Toward Ensuring Sustainable Development in Africa's Megacity

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**Abstract:** Polymer recycling is one of the major areas that need adequate intervention in any megacity's effort toward sustainable development. However, megacities in Africa face various challenges in general waste management and also lag behind in developing efficient waste-to-wealth services. Therefore, this study examined the difficulties experienced by the actors involved in the value chain of polymer recycling in the Lagos megacity. Thirty in-depth interviews and four key informant interviews were conducted with value chain and supporting actors, while 400 questionnaires were administered among residents of Lagos metropolis. The study found that negative public perception, lack of adequate capital, poor health conditions, inefficient infrastructure, and technological difficulties are some of the problems in polymer recycling in the megacity. Therefore, social label redefinition, effective dissemination of recycling information, an efficient loan system, import duty relaxation, and stakeholder involvement are recommended.

**Keywords:** polymer recycling; sustainable development; Lagos megacity; value chain; waste-to-wealth

## 1. Introduction

According to Rybaczewska-Blazejowska [1], the pillars of sustainable development include economic prosperity, environmental protection, and social equity, which are balanced so as to meet the needs of both current and future generations. Rybaczewska-Blazejowska [1] also noted that environmental sustainability in municipal waste management (MWM) revolves around the conservation of resources and reduction of environmental pollution [2], while economic sustainability in MWM refers to the integration of waste management options such that they are operated at the lowest possible cost, including investment costs, annual maintenance costs, personnel employment costs, and revenues from recovered materials and energy. Social sustainability in MWM is "the provision of appropriate level of waste services to meet health and comfort requirement of participants" with indicators such as visual impact, odor, the convenience of use, noise, and traffic nuisance [1] (p. 240). In this regard, waste-to-wealth activities such as recycling waste products are all the more relevant in ensuring sustainable development.

Over the years, it has been evidenced from the consequences of poor waste management and the failure of various policies that bedevil countries of the world (especially developing and less developed countries) that there is an urgent need to aggressively implement waste-to-wealth policies. Benedicta [3], in her study on the potentials of waste-to-wealth in Ghana, reported that most of the waste generated was not treated sustainably because of the lack of education of inhabitants and the absence of proper solid waste management, despite the fact that nondegradable waste formed 51% of the total waste mix of eastern Ghana. Benedicta [3] further revealed that no waste was separated

at the source before reaching the dump site, thus eliminating the value added from households. She noted that the consequences of such practices include soil degradation and environmental hazards, the high cost of operating waste separation plants, increased land demand and cost, land conflict, and destruction of soil composition and quality, among others. She contrasted this practice with the best practices in Germany, “where households and waste generators have the responsibility to sort wastes” [3] (p. 51).

The same phenomenon can be observed in Nigeria [4–6]. Sridhar and Hammed [5] observed that waste is mostly managed in the country in an indiscriminate manner. In markets and other public places, there is a mixture of liquid waste such as excreta with nondegradable waste such as plastics, which then creates problems for recycling facilities [5,7]. Most of the problems that bedevil Nigeria include an inefficient landfill system, poor health conditions, and a lack of household participation in recycling [6,8]. As a megacity and the economic center of the country, Lagos has continuously battled with the problems of waste management and was once tagged as one of the dirtiest cities in the world [9]. This led to efforts by the state government to establish institutions such as the Lagos State Refuse Disposal Board (LSRDB) in 1977, the Lagos State Waste Disposal Board (LSWDB) in 1980, and the Lagos State Waste Management Authority (LAWMA) in 1994 [9]. In 1997, the government started the Private Sector Participation (PSP) scheme with a pilot program in Somolu and Kosofe local government areas of the state, and it later became a full-fledged program across the state in 2004 [9]. The state government has made several efforts to partner with the private sector in terms of waste collection and transportation, and has drawn attention to the waste-to-wealth aspect of waste management through collaborations with social enterprises.

Opeyemi [9] examined the participation of the informal private sector in the waste-to-wealth aspect of waste management in the state, including state efforts to partner with some social enterprises to advance recycling activities. The actors in this sector include cart pushers, resource recoverers, resource merchants, and recyclers [9]. The informal sector has been considered as an important aspect of developing economies, especially for low-income earners. It is a wide sector that involves a variety of economic activities ranging from mining, production, and distribution to retailing. Within this wide array of activities, informal recycling has been thriving, especially in recent times, due to the increased awareness and discussion of sustainable development in developing countries. Opeyemi [9] acknowledged that the informal recycling sector is an institution in its own right, with knowledge of integrated waste management approaches concerning the collection, transportation, recovery, recycling, and sale of recycled materials to companies within and outside Nigeria. Informal sector recycling has been an avenue for employment opportunities and the development of entrepreneurship in developing countries [10]. Furthermore, studies have shown that the informal recycling sector has the highest percentage of recycling in developing economies [11]. The informal sector makes use of the large workforce available in developing countries with low capital expenditures. The sector ensures a steady supply of raw materials to manufacturing companies, and this ensures that produced goods are cheaper than if produced with virgin materials [11].

As highlighted above, several studies have been conducted on the informal recycling sector in Nigeria and Lagos [9–11]. However, little is known about the challenges facing value chain actors in informal polymer recycling in a developing country like Nigeria. Therefore, this study’s aim is to contribute to the literature by exploring the constraints faced by actors involved in the value chain of recycled polymer products in Lagos. An exposition of the challenges facing these actors will ensure that the attention of scholars and policymakers is drawn to the obstacles to the development of waste-to-wealth and sustainable development in the city. The study also investigated potential solutions to these issues, especially related to practice and policy development. In this paper, the authors reviewed the extant literature on the importance of the informal recycling sector in developing countries in order to emphasize the unique ways they have been able to meet the challenges of recycling. A section is dedicated to the methodology of data collection for the study, after which the

findings are extensively discussed. The paper concludes by proposing some policy recommendations to improve the value chain of recycled products in Lagos.

## 2. Research Methodology

The geographic area for the study was Lagos State, Nigeria. Lagos, though the smallest geographically, is an emerging megacity in the world and has the highest population in Nigeria (and arguably Africa), with 9,013,534 residents as of 2006 and a growth rate of 6–8% [12]. This makes it a central hub for industrial, commercial, and economic activities of Nigeria and even West Africa [13]. As a result, the state generates a very high amount of waste (about 10,000 mass tonnes per day), of which 15% is plastic waste [14], arising from the daily socio-environmental interactions of humans, making it a very suitable study area for the value chain of polymer recycling. The study also focused on Lagos metropolis, due to the presence of a majority of the actors involved in the value chain of recycled polymer products, dump sites where resource recoverers and other actors are found, and government agencies.

In this study, the population included the actors (such as resource recoverers, buyers, sellers, grinders, and producers) involved in the primary and processing stages of polymer recycling in Lagos metropolis, the executive members of the associations of these actors, and the officials of government agencies involved in waste management and recycling in Lagos State. A detailed study of the challenges facing the value chain social relationship of polymer recycling in Lagos metropolis must take into account various actors from the input to the output stages, including the organizations that provide support services, such as associations and government agencies.

The study was qualitative in nature, with interviews conducted with the actors involved in the value chain of recycled polymer products, the executives of those actors' associations, and the officials of government agencies regulating recycling and waste management in Lagos State. The study also employed nonparticipant observations to document the process of recycling through the activities of the observed actors. In all, 30 in-depth interviews were conducted among the actors to explore the challenges facing polymer recycling and waste-to-wealth in Lagos metropolis. A review of the extant literature on qualitative research shows that to ensure the point of saturation in qualitative data gathering, the study sample size should be between 20 and 50 respondents [15–17]. The respondents were selected through purposive sampling and a snowball approach by contacting top officials of agencies and associations through their recommendations, and then contacting the actors involved in recycling.

Aside from collecting data from the actors involved in the value chain of recycled polymer products in Lagos metropolis, there was also a need to investigate the supporting activities/services that enhance the value chain in the study area. Hence, key informant interviews were conducted with one representative each of the resource recoverers' association, the grinders and suppliers' association, the Lagos State Waste Management Agency (LAWMA), and a private waste collection company, making 4 key informant interviews overall. Nonparticipant observation was also employed for the in-depth study of the processes and activities involved in recycling and production of recycled polymer products in Lagos metropolis. In order to get data on the public perception of resource recoverers in the state, the authors conducted a field survey among 400 residents of the metropolis. The study also employed secondary data to back up and support the findings from the research. The qualitative data were collected by voice recording and later transcribed and categorized. The qualitative data were analyzed using thematic and content analysis. These 2 methods were chosen in order to complement the inadequacies of each qualitative analysis method.

### 3. Results and Discussion

#### 3.1. Challenges Facing Resource Recoverers in the Value Chain of Recycled Polymer Products in Lagos Metropolis

Table 1 highlights the difficulties recycling actors face in the value chain of recycled polymer products in Lagos State. The table presents the challenges faced by actors in each value chain stage, such as resource recovery, collection, processing, and production. Furthermore, Table 1 shows the inputs and major activities across the value chain while also presenting feasible solutions to the difficulties highlighted.

##### 3.1.1. Health Challenges

A prominent challenge observed and discussed by respondents is the lack of protective gear or gadgets for resource recoverers working on landfill sites, as presented in Table 1. This is particularly important because most of the resource recoverers, especially those from the northern part of Nigeria, have their residences on the landfill sites, where they eat and rest. As if the contaminated and germ-filled waste brought in on daily basis to the landfill sites and the resulting strong smells are not enough, observation reports show that most resource recoverers use the landfills as their bathrooms. In a similar study of resource recoverers in Abuja, Ezeah et al. [18] found that exposure to infections and other health challenges have increased tremendously among resource recoverers, increasing actual infections.

Field observations from the study show that resource recoverers mostly do not seem to bother or show any concern with the poor health conditions of their surroundings, activities, or lifestyle, as they are struggling to make a living from the waste. Although some resource recoverers make use of protective gloves, field observation shows that many consider overall protection as a sign of not being “ready for business”, because they believe that being able to endure and embrace the dirt is part of the business. At the time of the study, there were no health facilities either on the landfill site or elsewhere for resource recoverers, and they were left to take care of their health issues on their own.

Findings reveal that resource recoverers see their presence on the landfill site as a privilege by the government and therefore they do not need any extra social attention, although resource recovering activities and informal recycling have been seen as drivers of the recycling industry in developing countries and a means of tackling social problems such as unemployment and environmental degradation [19]. In cases of severe health complications, however, data show that the resource recoverers’ association encourages all stakeholders to support victims financially and through other means as the situation demands. That the absence of good health care for resource recoverers constitutes a challenge is an understatement, even though the consequences of such activities may not be immediately visible.

##### 3.1.2. Contaminated Waste

Findings from the study show that aside from the health challenges that resource recoverers experience on the landfill sites, they also encounter the problem of highly contaminated recyclable waste in dump sites. This problem arises as a result of the mixture of recyclables with other degradable waste, and over time they get polluted and are not useful for recycling. The issue is more pronounced considering that most polymer materials disposed of in Lagos metropolis are nondegradable in nature [20,21]. Therefore, they present a great danger to the environment and economic underutilization when they are not used for recycling purposes [21]. This particular problem can be seen as a consequence of the problems of the low level of household sorting and the ineffectiveness of transfer and load stations. Given the disproportionate quantity of waste produced and the frequency of dumping such waste compared to the number of resource recoverers available on the landfill sites, there is bound to be potential recyclable waste unrecovered and sitting useless.

**Table 1.** Mapping constraints and potential solutions in the value chain of recycled polymer products in the Lagos metropolis.

Value Chain	Resource Recovery	Collection	Processing	Production
<b>Input</b>		Plastic Waste, Nylon Waste	Plastic Waste, Nylon Waste	Plastic Pellets, Melted Nylon, Virgin Resin
<b>Activities</b>	Dump site resource recovery, household waste collection, religious center waste collection, commercial and industrial waste collection	Scaling of waste, sorting of waste according to type, bagging of waste, bailing of waste, transporting of waste	Scaling of waste, sorting of waste according to type and color, breaking down of plastic waste, washing of waste, grinding or melting of waste, sieving of waste, pelletizing of waste	Washing of waste, drying of crushed plastics, pelletizing, mixing, melting, blowing, production
<b>Actors</b>	Resource recoverers (from dump sites and streets), social enterprises (from households, schools, and religious, commercial, and industrial centers)	Small collectors, large collectors, social enterprises	Grinders, social enterprises, Producers	Producers
<b>Difficulties</b>	Lack of protective gadgets, poor health conditions, difficulties in waste transportation, inadequate motivation for household sorting, high rate of contaminated polymer waste in dump sites, poor perception of residents about recycling actors and activities, management challenges	Lack of adequate capital, poor quality control, transportation difficulties, power supply difficulties, technological difficulties, low household participation, management challenges	Lack of adequate manpower, Lack of adequate capital, Power supply difficulties, Lack of new and improved technology, Difficulties in transportation, Storage difficulties, Unfavorable government policies, Management Challenges	Equipment procurement difficulties, lack of adequate capital, lack of new and improved machinery, power supply difficulties, government policies, management challenges
<b>Feasible Solutions</b>	Suitable health regulations, social innovations, stakeholder partnership and support, infrastructure provision, manpower, efficient transfer stations, reorientation of residents, effective management	Easy access to loans, enforcement of quality control regulations, efficient transfer stations, provision of adequate infrastructure, ease of import regulations, citizen reorientation, effective management	Citizen reorientation, provision of loan facilities, infrastructure provision, ease of import regulations, government support and favorable policies, effective management	Ease of import regulations, provision of financial support, provision of adequate infrastructure, implementation of government policies, effective management

Source: Field Survey Data, 2017.

### 3.1.3. Public Attitude and Perception

The study reveals that most resource recoverers and other waste collectors indicated that they face the challenge of demeaning attitudes and poor perception of their activities and personalities by the general populace. This finding confirms a similar finding in Nzeadibe and Iwuoha's [19] study on the public perception of resource recoverers. Such perception has psychological implications on the resource recoverers and the potential for them to develop feelings of social exclusion. Findings also show that the reason most resource recoverers of Yoruba origin do not work on the landfill sites during the night is to prevent their friends, neighbors, or significant others from knowing what they do for a living. Some of the resource recoverers, especially those who live outside the landfill sites, engage in other menial jobs to make more income and serve as a front for the resource recovering work they do.

However, contrary to Nzeadibe and Iwuoha's [19] findings, the value chain actors were quick to observe that the general perception of residents of Lagos metropolis of recycling activities and the actors involved, including the resource recoverers, are beginning to change for the better. This is due to the realization that recycling is a means of combating unemployment, saving the environment, and creating a means of survival in light of the economic woes befalling the country as a whole [19]. To confirm this view, residents of Lagos metropolis who partook in the research were asked to describe in one word the people involved in the collection, purchase, sale, and/or recycling of waste for a living, and the results are presented in the word cloud in Figure 1, showing the frequency of each word.



**Figure 1.** Word cloud with size showing the frequency of words used to describe value chain actors of recycled polymer products in Lagos metropolis (Source: Field Survey Data, 2017).

From Figure 1, it can be observed that the majority of respondents described the value chain actors of recycled polymer products with positive words such as “hardworking”, “industrious”, “recyclers”,



“entrepreneurs”, “smart”, “survivor”, “organized”, “important”, and “environmental protectors”, among others. Some respondents believed that society is lucky to have people like resource recoverers and recyclers who go into such jobs to protect the environment, while some respondents saw it as a means of reducing unemployment and creating jobs instead of engaging in social vices such as stealing or thuggery. The enduring of physical and emotional stress, the difficulties, and the health dangers in resource recovery and the negative perception of some people toward the actors made some of the respondents regard them as hardworking, resilient, rugged, and perseverant. Some respondents believed that the entrepreneurship skills of the actors show in their willingness and ability to take risks and overcome challenges in order to make a living. Their efforts in ensuring that waste does not litter the environment and constitute a health hazard to people make some respondents refer to them as eco-savers, environmental protectors, waste managers, and environment savers, among other things.

Findings from the study show that common term used by value chain actors, especially those who have stalls and transact business on landfills, to describe the landfill is “bola,” while the resource recoverers are called “bola-bola.” The word “bola” has a Hausa origin, meaning “waste,” and the term “bola-bola” may refer to the resource recoverers who pick waste on streets and landfill sites. This is similar to the finding by Adama-Ajonye [22] in Kaduna, where the young waste-pickers who make money from picking waste are referred to as “yan bola”. However, negative narratives and perceptions still linger in the descriptions of residents of Lagos metropolis, as shown in Figure 1. Some study respondents viewed recycling actors as dirty, lazy, poor, stinking, suffering, being harassed, tattered, and unhealthy, among others. These respondents saw collecting waste as a thing only low-class people would do to earn a living. They believed that those involved in such a business do not have any better options and therefore have to risk their health and self-esteem to deal with waste.

#### 3.1.4. Waste Transportation

Table 1 also brings to light the difficulties experienced by social enterprises in the aspect of recovering waste from residential households and commercial centers in Lagos metropolis. A major challenge faced by social enterprises in Lagos has to do with the issue of transporting waste from households and commercial centers across the metropolis. As discussed by interview respondents, social enterprises face the issue of maintaining the vehicles used in transporting waste, as they often break down due to the pressure of the waste and the nature of the roads. For instance, WeCyclers, a social enterprise involved in recycling in Lagos metropolis, started the idea of using tricycles to reach communities, in order to reach households, employ youths, fast-track community involvement and a clean environment, save transportation cost, and reduce carbon emissions, among other benefits [23]. However, as the findings show, the cycles could not stand the test of time due to pressure from the waste and the poor nature of the roads. The use of other vehicles to transport recyclables increases the cost of input and contributes to global carbon emissions, thus, is not sustainable for these social enterprises.

One respondent expressed the concern as follows:

*As I told you earlier, the transport systems are bad. We actually have a lot of challenges when it comes to that. Like some two weeks ago, two or three of our tricycles were bad and people started calling but there was nothing we could do. We just have to apologize to them.*

(IDI/Hub Supervisor/Female/Ebute-Meta/March 2017)

Further data analysis discloses that social enterprises also face difficulties in covering all the residential areas across the metropolis because of a shortage of manpower. The study reveals that this could be attributed to a lack of interest by most people in engaging in such activities due to the assumed social perception about working as a waste collector. Thus, social enterprises in the state face challenges in terms of manpower, such as getting drivers of vehicles that collect waste from households. Study findings demonstrate that these social enterprises are unable to meet the collection demands of their clients because of the shortage of drivers. A respondent further explained this issue:

*Now we have some people who are joining as franchisees in partnership with First City Monument Bank (FCMB). They want to get more people involved in this whole waste-to-wealth business and they want people to kind of use our model. So they will be working with WeCyclers and they will hire their own maybe one or two people to start, they have their own bikes and their own routes. But the challenge currently is that we can't find boys to drive the bikes, because they are like they don't want to do this job or it is too hard or they don't feel like working close to where they live but at a location that is far away to where they live so people won't know that this is where they make their money, because they don't feel proud of it.*

(IDI/Business Development Assistant/Male/Victoria Island/March 2017)

Respondents across the value chain also pointed out the challenge of finding the right management team to handle and monitor the activities of the enterprises or companies and how this could spell doom or bring about advancement for the company in question.

### 3.2. Challenges Facing Collectors in the Value Chain of Recycled Polymer Products in Lagos Metropolis

In terms of collection, the actors involved in this stage include small collectors, large collectors, and social enterprises, and they engage in activities such as scaling and sorting recyclables by type, bagging or baling washed recyclables, and transporting the recyclables to clients such as grinders and producers, as shown in Table 1. Field observation reveals that social enterprises not only sell these recyclables after baling them, they also engage in further processing, such as grinding the polymer waste into flakes. However, study findings show that collectors face a number of challenges, including inadequate capital, poor quality control, transportation issues, power supply issues, manpower and storage difficulties, low household participation, and lack of improved and advanced technology.

#### 3.2.1. Business Capital

In emphasizing the capital challenges, a respondent put it as follows:

*There are loan provisions in the normal way, but it is not easy to find financing that is tailored to this type of business, because every business has its own unique thing and we are an unusual business in a way. It is not easy to find that kind of financing, but we are hoping that the federal government and state government gets more involved by creating that kind of facilities for businesses, and that would go a long way in helping us.*

(IDI/Business Development Assistant/Male/Victoria Island/March 2017)

Small collectors, mostly previous resource recoverers, are those who are in the collection stage by buying recyclables from resource recoverers and selling them to large collectors. However, most small collectors hardly have enough capital and have to rely on some large collectors to give them financial backup to start the business, but get the loyalty of the beneficiary and dedicated service in return [19]. Aside from this, study findings reveal that collectors face the issue of poor quality control, as some resource recoverers include contaminated and degraded materials as part of what they sell to collectors. This increases input cost, reduces output quantity, and reduces the marginal profit of collectors.

#### 3.2.2. Technology and Awareness Creation

In terms of expanding the scope of business, as shown by the study findings, collectors who would like to start grinding have difficulty procuring advanced and modern technology, due partly to an inability to obtain required capital and partly to stringent import regulations and high exchange rates [24]. Furthermore, although there are efforts by government agencies and social enterprises to sensitize residents and households to the need for and benefits of household involvement in recycling, interview respondents believed a substantial part of households in Lagos metropolis are still not involved in or aware of the importance of sorting and selling household recyclables and arrangements for how to make income from these activities.



### 3.3. Challenges Facing Processing and Production Stages in the Value Chain of Recycled Polymer Products in Lagos Metropolis

The processing stage of the value chain of recycling involves transforming polymer materials into flakes. The actors include grinders, social enterprises, and some producers. However, study findings show that the actors in this category also face some challenges, including inadequate manpower for expansion, lack of adequate capital for production improvement, increased cost of production as a result of poor power supply, inability to acquire new and improved technology, storage difficulties, and government policies, among others. On the role of the government in providing capital support for processing actors in Lagos, a leader of an association of value chain actors commented as follows:

*The Lagos state government is trying its best, because we sometimes benefit as members of trade union and artisans in Lagos state. Ministry of Commerce and Industry through the wealth creation scheme approached us that the government wants to help us and give us money in which we applied. They still tried and give some people and some people are yet to get. The one they give is not enough to do our business. Some got 100,000 naira, some 150,000 naira, but it is not enough. Sometimes we hire transport services to convey our materials from point of purchase to our place for 50,000 naira. So the money is nothing to write home about.*

(KII/Former Chairman/Male/Abule-Egba/April 2017)

The most challenging of these issues for the grinders concerns the privatization process, or the Cleaner Lagos Initiative embarked on by the current government of Lagos State [25]. In this case, the landfill sites will be transferred to private individuals and waste collection companies will be confined to commercial centers only. A majority of the respondents viewed this as having a negative impact on their business as a result of the stringent rules and increased cost of buying recyclables from collectors and resource recoverers on the landfill sites. The privatization and increased bureaucracy of landfill site governance will affect the cost of resource recovery and small collection on the landfill sites, which in turn will increase the value chain cost value of recycled polymer products. Respondents believed that this will not only affect the actors in their business activities as a result of increased cost, but will also lead to increased prices for final recycled polymer products. A respondent described the plight they face in this area as follows:

*The market is okay, but notwithstanding there is no market now because Lagos State government is handing over the landfill sites to the private sector. Our members are suffering under the new private sector administration. There is no way to buy their market. Then things that they buy like 10 naira or 20 naira before is now costly. Before when we get there, we go directly to buy from the resource recoverers. Even LAWMA used to tell us to pay a certain amount for registration before entering the dump site, which we did. Not quite more than a month, we learnt they had given it to the private sector. The private sector now makes another charge for registration, and before you take your goods out, you will weigh it. For example, in Olusosun landfill site, if I carry four tonnes, I will have to pay a royalty on each kilo I bought after paying the resource recoverers that sold the goods to me. There was nothing like that before.*

(KII/Former Chairman/Male/Abule-Egba/April 2017)

In the production stage, the producers who turn polymer materials into recycled polymer products such as plastic plates and spoons, automobile parts, grocery bags, and so on also face difficulties in procuring advanced equipment and technologies for improved production [24]. A grinder, producer, and recycling technician summarized this issue thus:

*Recycling activities are all about research and development and the implementation of that R and D. I told you that currently we are restructuring the facility. The reason for restructuring the facility is to bring in additional newer equipment that could be more efficient in terms of productivity. But the problem we have has to do with the exchange rate and the importation policy of the federal government. We need to bring adding newer equipment but the problems in the country are currently affecting our expansion.*

(IDI/Grinder-Producer-Recycling Technician/Male/Ikeja/March 2017)

Some of the small-scale producers have challenges in procuring financial support to expand the productivity and scope of their business. There is also increased cost of production due to the constant purchase of fuel for company generators and an inadequate power supply by the government. Unfavorable government policies on waste management also have ripple and cyclical effects on the value chain of recycled polymer products.

#### *3.4. Feasible Solutions to the Challenges Facing Value Chain Actors of Recycled Polymer Products in Lagos Metropolis*

Table 1 presents feasible solutions to the challenges faced in the value chain of recycled polymer products in Lagos metropolis as discussed and identified by qualitative and quantitative respondents.

Respondents believed that the government needs to take the lead in providing solutions to the issues faced by resource recoverers in the study area by enacting suitable health regulations that will guide resource recovery activities in the state. For instance, findings show that there is a need for standard practice guidelines in terms of protective items such as boots, gloves, and facemasks that would be made compulsory for everybody involved in resource recovery on landfill sites across the state. This will help to prevent avoidable diseases or injuries that could be contacted or sustained while recovering resources. Respondents agreed that further effort by the government to establish health centers close to or inside the landfill sites would enable easy access to quality healthcare not just by resource recoverers but also by other workers on the landfill sites. According to the study findings, there is also a need for the various stakeholders in both the public and private sector to be brought on board to enhance and create an environment for resource recoverers to work, especially with the transfer of ownership of landfill sites to the private sector [19]. There should be policies that ensure that resource recoverers are not exploited and their socioeconomic interests are met.

Also in the area of resource recovery, according to the study findings, social enterprises require financial and technological support and partnership from the government, donor agencies, and private organizations, as their activities require a lot of funds and technical backup for effective operation. Although social enterprises have some partnerships with multinational corporations and government agencies in the use of facilities and trade promotions, there is still a need for further cooperation in order to advance and extend household recycling in Lagos State, thereby enhancing the value chain of recycled polymer products. According to respondents, it is also important that necessary infrastructure is provided to aid the smooth transfer and processing of polymer waste across the metropolis. Smooth roads, constant power supply, provision of loans and other financial instruments, construction of transfer stations close to communities across the metropolis, and storage and processing facilities are some of the important elements needed to aid the recovery of polymer waste in the study area.

The study found out that most residents believed that the government is not showing enough interest in recycling in the state, and this encourages residents not to take recycling seriously, especially from the source. Therefore, respondents proposed that there is a need for the government to facilitate the reorientation and sensitization of residents of the metropolis to the importance of recycling, the socioeconomic benefits, the environmental gains, and the processes involved in household participation. Respondents noted that an aggressive campaign on the part of the government for better recycling activities backed up with the necessary institutional arrangements will greatly change the

attitude and enhance the participation of households in the value chain of recycled polymer products across the metropolis. In describing efforts to encourage sorting from the source, a social enterprise respondent had this to say:

*What we actually tell the households is that they separate them for us so it will be easier for the drivers to transport. As you can see, when the drivers brought it, they have PET bottles inside one bag, they have sachet inside another bag, and they have the can inside a separate bag. That is how it is done. So when the washers get them, they sort the PET bottles into green, blue, and white colors, but they don't do that at the household level.*

(IDI/Hub Supervisor/Female/Ebute-Meta/March 2017)

In proposing solutions to the challenges mapped in Table 1, collectors, processing enterprises, and producers believed that providing better access to loan facilities would boost their economic activities and in turn enhance the value chain of recycling polymer products in the state. They requested easing of the stringent conditions attached to loans and recognition of the recycling industry by financial institutions and government agencies. Furthermore, they recommended that associations, government agencies, and private investors involved in managing the operations of landfill sites should see to the enforcement of quality control regulations among the resource recoverers in order to improve the effectiveness of the polymer waste recovered and reduce input costs associated with contaminated polymer materials.

With the difficulty always encountered as a result of the bureaucratic nature of landfill sites, especially those under private control, collectors, processors, and producers believed transfer stations across the metropolis and other infrastructure such as transport facilities will lead to a better recycling process and cost-efficient movement of recyclables across the value chain from one actor to another. Collectors, processors, and producing companies do make efforts to import equipment that would advance their activities but are faced with stringent import regulations from the government. Therefore, they opined that the government should ease such regulations in order to improve recycling activities in the state and make it more modern to suit the demands of the evolving megacity. In this light and as discussed above, they clamor for household participation in recycling but also want the government to create platforms where they can reach households directly to get polymer waste for recycling.

They also suggested that the implementation of some government policies and eradication of other unfavorable ones will create an enabling platform for actors in the value chain of recycled polymer products to perform their activities efficiently. For example, they noted that effective implementation of the Cleaner Lagos Initiative would see an increase in participation in recycling activities across the metropolis and redefine the stigma attached to waste and waste actors by residents in the state. The challenge of management across the value chain can only be solved internally when business owners and entrepreneurs ensure that they employ a workforce with the right skills and technical know-how.

#### 4. Recommendations

In order to effectively ensure that the goals of sustainable development of megacities such as Lagos State are achieved through vibrant recycling activities, improved technological capabilities, and informed value chain actors, there is a need for all stakeholders to consciously pursue various plans of action that will lead to the socioeconomic development of the people. In line with this, the following recommendations are suggested.

The research found that one of the fundamental issues facing the bottom line of the value chain of recycled polymer products is the social construction and labelling of recycling actors, especially those in the informal sector and at the bottom line, as people who are suffering, poor, or not healthy. These negative stereotypes have been imbued into the words “scavenge” and “scavenger” and create an unpleasant image for the actors and their occupation. In the light of this, policymakers could engage in concept and nomenclature redefinition and reorientation to further increase the positive

attitude already being observed in the metropolis. For example, scavengers could be called resource recoverers, as done in this study. The term “resource recoverer” in itself connotes a positive image of someone who works to save the environment, and its wide usage as the social label for scavengers would help change people’s perception of these actors and make it a noble pursuit for youths to engage in. Social enterprises, nongovernment organizations, mass media, and government agencies could drive this initiative through various programs, seminars, and advertorials in real time or through mass/social media to create awareness of the issue.

Another issue revealed by the study is that of low household participation in recycling in Lagos metropolis. Social enterprises are making efforts to connect households to the value chain. However, the research found that most households that are aware of income generation from the sorting and selling of polymer waste do not have enough motivation to engage in such. Findings reveal that most of the households felt that the points they get after selling recyclables are not commensurate with the effort, time, and resources invested in household recycling. Aside from this, most still do not know the importance of recycling to their communities and how the activity directly affects their lives. Therefore, effective dissemination of information about both the economic and social benefits of household participation in recycling is proposed. It is recommended that social enterprises could find a way to increase the economic value households get from selling their waste in order to make such an option of action attractive to them by increasing the monetary value of points and/or offering better gift rewards for their accumulated points. There is also a place for intensive recycling campaigns and extended recycling services in communities lacking the information and/or the means to participate in recycling.

To alleviate the challenge of lack of capital for most of the small-scale enterprises in the value chain of recycled polymer products in Lagos metropolis, stakeholders such as government, investment banks, nongovernment organizations, and private investors could design a system through which funds could be collated and then loaned to the small and medium-sized enterprises (SMEs) in polymer recycling at low-interest rates and reduced loan conditions. The recyclers’ associations could play this role if well-structured and effectively monitored, due to their platform of registering and supporting members in the value chain. Similarly, the associations could be empowered to get some modern technologies, equipment, and machinery used in recycling such as improved grinding, pelletizing, and washing machines. The associations could then offer services at a reduced cost to members who cannot afford to buy these machines. The profits from such an endeavor could be put back into the association to serve as soft loans for members in need of financial support.

Relaxing import regulations to enable recycling actors to bring in advanced and more efficient technologies to aid in processing and producing recycled polymer materials is also suggested. However, developing technologies locally is also important in advancing a recycling system. Promoting local ideas, experiments, and discoveries by stakeholders in areas of technology, system creation, opportunity identification, and implementation is very important to get more young and brilliant minds involved, improve the level of acceptance, and make it a vibrant industry in the economy. Finally, a stronger partnership among multinational corporations, multilateral organizations, indigenous organizations, community development associations, landlord associations, market associations, youth organizations, private investors, local government authorities, state governments, and the national government is an effective way to bring about an efficient and successful polymer recycling value chain.

## 5. Conclusions

Polymer recycling is a very important socioeconomic and environmental activity to ensure the sustainable development of cities and nations. Aside from bringing about environmental protection and good health conditions for residents, it also creates economic benefit in terms of cheap polymer production. Polymer recycling provides numerous opportunities for entrepreneurs to explore and creates employment for formal and informal workers, thereby improving standards of living. It also gives room for grassroots participation in the sustainable development of the community while creating

additional sources of income for households through sorting and selling recyclables to recycling agents. However, polymer recycling has yet to realize all these potential benefits in developing economies such as Nigeria. As a result, this study sought to examine the challenges that hinder effective action along the value chain of recycled polymer products in Lagos megacity, Nigeria. Adopting a mixed methodology, qualitative and quantitative data were collected from value chain actors and supporting actors in polymer recycling and residents of Lagos.

The study found that value chain actors in polymer recycling are faced with issues such as unfavorable government policies, unavailable financial resources, poor health conditions, lack of infrastructure, poor attitudes toward recycling, and lack of adequate information on the recycling process. Some of the feasible solutions proposed by respondents to these challenges include health regulations, infrastructure provision, ease of access to loans, effective management, and reorientation of residents, among others. The study highlights some recommendations to promote waste-to-wealth and ensure sustainable development in the study area. First, there is an urgent need for full participation by both public and private stakeholders in order to enhance polymer recycling activities in the metropolis. Second, redefining some recycling terms could promote a positive attitude toward recycling and reorientation among residents, for instance, by referring to waste pickers as resource recoverers instead of scavengers. Other recommendations include improving household recycling benefits, providing a loan pool for SMEs in polymer recycling, and relaxing import regulations to enhance technological improvement.

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