

WASTE RECYCLING IN DEVELOPING COUNTRIES IN AFRICA: BARRIERS TO IMPROVING RECLAMATION RATES

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SUMMARY: The volumes of waste being generated in any city, and that must be collected and disposed of, require ever increasing funds to manage it and it is also creating increasing environmental concerns. In the developing world reclamation of recyclable waste products from the municipal waste stream has become an important source of revenue for many people who cannot find formal employment and it is their only source of income. The level of reclamation varies substantially however between the different countries in Africa.

It has been found that there are a number of barriers to improving, or formalising this process, and this paper will aim to identify these barriers and will propose a number of potential solutions to improve the recovery rates as well as the income stream for the individual reclaimers. In Africa in general, reclamation is done by the informal sector in a very unorganised manner and is mainly done by very poor unemployed people who are able to improve their way of life and get a small income by scavenging firstly usable items such as containers for storage of household items, material to construct shelters with, clothing, etc or food, and secondly items that have a value and can be sold to recyclers. Because the recycling industry is still in its infancy compared to the manufacturing industry, the reward for recyclable materials fluctuates a lot. There is also a very limited market for recyclables, and it is also a fact that in a number of areas the general recycling market is just not aware of the potential value in reclaimed materials.

A number of interventions by the various levels of government, the donor community or NGOs can significantly improve recycling rates and create different methods of additional employment, or income generating opportunities.

1. INTRODUCTION

The volumes of waste being generated and which must be collected and disposed of, is requiring ever increasing funds to manage it and is creating increasing environmental concerns due to large landfill sites which are not properly operated and are causing major pollution. Any possible method of saving on the quantity of waste going to landfill must be implemented. In the developing world reclamation of recyclable waste products, or re-usable items from the municipal waste stream, has become an important source of revenue for many people who cannot find formal employment. It must also be noted that in general developing countries cannot afford to pay unemployed people any social grants, so they have to try

anything to stay alive. As an example it has been estimated that in South Africa about 150 000 people make a direct living from the various components of the process of reclamation of recyclable waste. The level of reclamation however varies substantially between the different countries in Africa.

There are however a number of barriers to improving, or formalising this process and a number of these barriers have been identified. Various potential solutions are proposed below to improve the recovery rates as well as the income stream for the individuals involved in the reclamation industry.

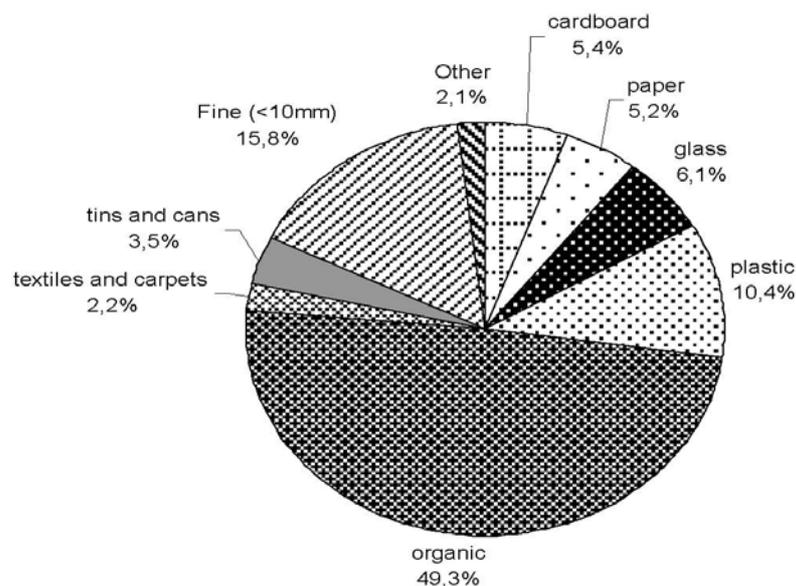
In Africa in general, reclamation is done by the informal sector in a very unorganised manner and is mainly done by very poor unemployed people who are striving to improve their way of life and get a small income by scavenging firstly usable items such as containers for storage of household items, material to construct shelters with, clothing, etc or food, and secondly items that have a recyclable value and can be sold to recyclers.

Due to the large quantities of recyclable materials arriving in the waste at landfill sites, informal salvaging, also known as scavenging, on the landfill sites is widespread in Africa. This practice obviously creates a situation of unacceptable health and safety risks for the reclaimers, as well as operating problems for landfill managers. It must be noted that the term reclamation is used in this paper for the process of picking (salvaging or scavenging) or collecting recyclable materials, while the term recycling refers to the processing or remanufacturing of the reclaimed material into a useful item or base material to be used in various manufacturing processes.

2. BACKGROUND TO RECYCLING

2.1 Waste composition

Before one can start to really address the issue of improving recycling rates, one has to look briefly at the total picture of reclamation and recycling at present. What does a waste stream typically look like? A typical analysis of the waste stream in one of the District Municipalities in South Africa is as follow:



The potential for recycling is evident from the above waste analysis. As can be seen, one of the biggest components of waste going to landfills are organic materials. These organic materials should be converted by processing to compost and then returned to the earth as a soil conditioner or fertiliser, and not disposed of at expensive landfills. The remaining total waste stream to landfill can further be lowered on average by at least 18% through reclamation of recyclable materials.

2.2 Benefits of recycling

By reducing the volumes of waste by composting and recycling, the airspace savings at the landfills enables an extension of the life span of the landfills, as well as an obvious saving in operational costs.

Separation at source is the foundation for creating value and reducing costs within an integrated waste management system. For example, a can in a village has no value. Once it is removed to a collection point where it can be combined with other cans, it then begins to have a commercial value. When transported to a buy-back centre and processed it has even greater value.

Once a business process has been established that generates value, we can begin to use this new reality within a strategically led waste management planning framework. This value can be used to explore improvements to the lifestyle of the people interested in reclamation or to foster community based small business development and to improve income generating opportunities. The details as to exactly how to do this should be handled through a planning/consultation process relevant to the local reclamation potential leading to a business plan.

In developing the recycling business processes, the principle business focus of the municipality always is to reduce the costs of transport and land filling. The value contained in the recyclables is a by-product of the business process. Given the municipality's developmental priorities it can view this value as a developmental tool rather than seek to recover all the direct costs involved through license fees or sales, because the municipality's direct costs are more than compensated for by the savings in transport and land filling. A municipality should not be in the business of recycling as it is generally not financially feasible if done on a sophisticated level and with the high cost of municipal employees, and the municipality can rather use its developmental initiatives (small business support, etc) to make it possible for community based organisations or businesses to extract the value contained in the recyclable materials.

Once a viable community based recycling system is in place, this will in turn create new opportunities for the municipality to reduce its own costs. For example, initially it may be necessary for the municipality to move all recyclables to one or two buy back centres. But over time as the capacity within the reclamation/recycling community grows, it should be possible for the municipality to arrange for commercial collection directly from collection points. This may result in a reduced need for buy back centres and a significant reduction in transport costs to the municipality as it will no longer have to move the recyclables from the collection points to the buy back centres.

2.2 Components of recycling

Recycling can be done in three ways namely: Reuse, Resource Recovery and Composting.

2.3.1 Reuse

Reuse can be achieved by:

- Using items more than once so they stay useful for longer
- Making useful items from waste such as toys, artworks, ornaments, sandals, carry bags, etc.
- Giving away unwanted household items to someone who needs them and can use them rather than throwing them away

2.3.2 Resource recovery

In Resource Recovery, waste such as cans, glass, paper and plastics are crushed or ground down and then used in the factories to make new products.

Glass is collected for recycling into new glass products such as cullet (crushed glass), broken glass or alternatively as whole bottles, which will then be cleaned and reused.

Any steel or aluminium waste, such as tins, old metal items, etc are collected and sold to the steel mills for recycling.

Plastics collected are recycled depending on the type of plastic, into items such as plastic irrigation pipes, plastic bags for waste collection, barrier liners, hollow fibre, etc. Due to the lightweight nature of plastic, the economics of plastics recycling are very sensitive to labour costs for collection, sorting and processing, as well as transport costs and then electricity and water consumption costs for washing and processing of the recovered materials.

A resource recovery system

Separation at source is the foundation for an Integrated Waste Management System (IWMS) including recycling. The challenge is to concentrate on sufficient recyclable materials so that it becomes economically viable to sell them to an end user, even if located at some distance from the point of separation.

Many special projects aimed at resource recovery fail because they are based on extracting materials from mixed waste. Salvaging at landfills is typically part of such projects. It has proven difficult to raise enough money through sales to provide even a minimum wage for project participants.

In an IWMS the value of recycling can be found not only in the money made from the sale of materials but also in savings gained in landfill management and landfill airspace by avoiding the dumping of recyclables. Separation at source makes it possible to design a completely new business process capable of increasing the value of recyclables and maximising the savings in landfill management.

Such a system can be structured with the following main components:

- Separation at source
- Collection and transport
- Buy Back Centres (BBC's)

From the collection point, the recyclables can either go to a BBC or directly to a recycling company for delivery to an end user. Residents can also have the option of directly bringing their recyclables to the BBC for cash where distances make this economically feasible. Schools or organisations in a community can convert recyclables to cash at a BBC. Separation at source makes all of these options possible and also more financially feasible. The Municipality can also keep the option to collect recyclables from collection points and transport them to a BBC or sell them directly to a recycling agent or an end user. A Municipality can externalise the cost of this transport by licensing access to this waste to a contractor who makes a profit from processing and transporting the recyclables.

In more densely settled areas, the Municipality can license out the right to collect recyclables

at kerbside. In this event, the Municipality can avoid the collection of a significant portion of the waste. Thus a current cost can be replaced by a revenue stream, or at least a saving in costs.

While separation at source is being implemented, large volumes of recyclables will continue to go to the landfill. As long as this is a reality, there will be salvagers at the landfill. One ameliorative intervention should be noted which is to provide salvagers with health and safety awareness training, and to make safety equipment and proper ablution facilities available at the landfills.

As stated above, the foundation for effective resource recovery is separation at source. The concept described above is a core strategy that takes advantage of the value that is created by separation at source. But there are many specific ways in which resource recovery can be accomplished. These include school based programmes that can combine education with fund raising where learners bring materials from home. Households can take materials directly to a buy back centre. As separation at source develops, the volumes available may justify setting up equipment to process the materials such as glass crushing or granulating the plastic. This in turn could produce enough raw materials to attract manufacturers who can use the material. Community based projects to use waste as a raw material might be justified in a small scale for the tourism market or other markets. In addition, municipalities can make arrangements directly with end users including industry organisations such as the plastic federation for direct buy back of bulk materials.

It must be stressed here that the above is still an idealised solution which is still very seldom seen in operation in developing countries, but the principles remains very relevant to the following discussions.

2.3.3 Composting

Home composting of all organic materials should be promoted and used in the home garden to improve the soil and production of any vegetables or fruit, but it may also be possible to produce compost on a commercial basis at the community level.

3. BARRIERS TO RECYCLING

Although the general aspects on recycling has been mentioned above, there are a number of barriers to improve recycling, especially in the developing world.

One of the foremost factors in respect of poor reclamation for recycling is general ignorance as to the potential value of waste materials. In very poor communities in rural areas there is also normally a substantial shortage of entrepreneurial skills and lack of drive to develop potential marketable items from waste products.

Because the recycling industry is still in its infancy compared to the manufacturing industry, the compensation for recyclable materials fluctuates a lot. As a result of this reclaimers may move into collecting say paper when the buy-in price of paper by recyclers increases and you will find a number of new entrants to the market. The law of supply and demand is however very evident and as soon as the supply of reclaimed paper exceeds demand the price then drops significantly, with a resulting drop in income of the reclaimers and resulting in negative social problems. Another fact that is evident from the young and very informal recycling industry, is that the market is very unstable due to over and under supply. As environmental pressures also play a great part in the involvement of the manufacturing industry in recycling initiatives, sudden changes in the market happens from time to time.

An example is mounting pressures on a particular government to limit plastic waste and therefore causes the government to implement legislation to limit plastic bag usage, which then triggers, or some will say forces, the industry to give serious attention to recycling and a market for recycled plastics are thus created in this way. Once the market comes into existence reclamation suddenly picks up at quite a pace as suddenly there is a market for previously useless material, and everyone jumps on the bandwagon and it thus creates an oversupply to the recycling industry, who then responds by lowering the buy-in price, which in turn leads to players losing interest, and if there is not enough interest, the supply goes down too much and an undersupply is created which forces prices upward again. Because of the very informal nature of the industry this may take quite some time to stabilise.

In most countries in Africa, and probably in many other developing countries, there is a very limited market for recyclables as in many instances, the international recycling companies feel that there may not be enough material to establish a local recycling plant, or alternatively the cost of transport destroys the financial feasibility of buying from reclaimers and transporting over long distances. It is also a fact that in a number of countries, or areas of countries, the market is just not aware of the potential value of reclaimed materials. It also happens that there is just no manufacturer in a specific country who can use reclaimed materials with a recycling value.

In some countries you will find recycling or processing factories, or there will be buyers of recyclable material for export along the coastal cities with ports or in the large inland cities, but the cost of transport from smaller, or far off, centres becomes prohibitive.

4. PROPOSED SOLUTIONS

4.1 Assistance from government

In answering the question of “what can be done to improve the situation”, a number of actions are hereby suggested which can be undertaken by the various levels of government, donor support programs or non governmental organisations (NGOs) to assist in improving the situation.

4.1.2 Foster Public Education and Involvement

One of the first aspects where government can play an important role is by improving the awareness of the potential value of recyclable materials amongst people in Africa. In order to do this effectively the officials need to be fully informed about the total recycling process. International support in this regard can play an important role in building this capacity as well as providing technical assistance in awareness raising programs.

A well-planned public education and awareness program will foster participation in recycling. Public participation in recycling programs is one of the most important factors deciding a program's success

The entire program must be designed to maximise participation. This involves making participation as convenient as possible for residents and businesses. An integrated, comprehensive public outreach program will be one of the keys to a recycling programs' success. The public must know the importance of recycling, the nature of the local waste stream problem, and how they can get involved. Procedures for curb side and drop-off programs will have to be publicised, and participation and materials recovery rates will have to be monitored

4.1.3 Assistance in establishing outlets to receive reclaimed materials

One of the most difficult yet fundamentally important tasks decision-makers must deal with is finding an outlet for the recyclable materials collected. Identifying markets, securing agreements with material brokers and end-users and meeting buyer specifications are all part of this task. Recycling programs must be designed with the flexibility of handling fluctuating markets and uncertain outlets for materials. Consequently, market analysis will be both a planning and on-going activity, as even the most successful recycling programs can be severely affected by market oscillations.

4.1.4 Investigate ways and means of increasing the use of waste products, and distributing it to interested parties

Decision makers can also play an important role in recycling by working to build local markets for recyclables in the community. This can be done by encouraging businesses and industries who use recycled materials to come to your community or by expanding the local use of recyclables that is already taking place. These businesses will provide a reliable market for recyclables and increase jobs.

4.1.5 Investigate ways to improve the recyclability of materials.

In this regard it can be said that the packaging industry is very ingenious in developing new and better packaging materials from a strength, cost and practical utilisation point of view, but in general with total disregard to the recyclability of the material. As example it can be mentioned that many new packaging materials consist of totally different types of material fused or bonded together, which makes it totally unsuitable for recycling as the materials cannot be separated.

4.1.6 Creating financial stability in the recycling market

It will assist the whole reclamantion process significantly if it were possible to stabilise the recyclable material markets financially. This can be done by government intervention by either subsidising the price of the reclaimed materials, or by setting up a market instrument whereby prices will be stabilised by buying material in at a profit when resale values are high and then subsidising it when the value goes down (equilisation fund). In general this may not be popular with developing country governments, and it may also create a fund which can be abused.

4.1.7 Involving the manufacturing sector.

Governments can play an active role in involving the manufacturing, or import, industries by creating a forum whereby industry are invited to come to the table with suggestions as to solutions to the above problems. Industry has proved that they can be very clever in developing solutions to improving packaging, so they should be able to assist greatly in alleviating the problems in recycling. In general they also have the financial means to assist with the implementation of any interventions.

4.1.8 Legislative interventions by Government

A solution which is always a possibility, although in the modern world not always very popular, is for Governments to pass legislations or regulations to limit non-recyclable packaging material being produced and sold by the manufacturing sector producing and using packaging materials. As example it can be mentioned that a first world country such as Germany have extensive regulations in place in this regard.

4.1.9 Green procurement policies

Governments can also lead the way in propagating recycling by adopting green procurement policies, which will entice the industry to adapt to it very quickly. This means that procurement policies are adapted to specify that all products offered to government must be accompanied by a certification as to the recyclability of any product offered. Green procurement also includes other environmental requirements of the product manufacturing cycle of the product offered, and that must not be neglected.

As soon as industry see that government procurement, which in most cases are a major purchaser of products in a developing country, are placing great importance on this, they will take note and start attending to the problem.

4.1.10 Assistance by NGOs or Donor support

Although the above interventions are mentioned as actions which can be undertaken by governments, it is also a fact that most developing country's governments are faced with massive infrastructure and social problems and quite often do not have the time or funds or political support to attend to these types of problems, or they may simply not have the will to address recycling. Donor aid programs and NGOs can however play an important part in assisting in this regard.

5. CASE STUDIES

5.1 The South African experience

In SA, recycling has developed on a commercial basis without financial incentives from government. These activities include the recycling of paper, plastics, steel cans, aluminium, glass, oil, and rubber.

Paper and fibre recycling is well developed in SA, with large paper companies (SAPPI, Mondi, Nampak) utilising waste paper to produce new products. Agents receive collected paper products, bale them and transport them to the factories on behalf of the companies. In spite of this recycling, a large amount of paper is still found in mixed waste going to the landfills by when it is contaminated and has a very low value. This indicates the potential to increase source separation of paper and board, which would result in increased recycling of higher quality paper and cardboard.

Steel beverage cans, other steel containers (such as food tins) and aluminium cans are recycled mainly through Collect-a-Can. Collect-a-Can has a de-tinning facility in Gauteng with significant reserve capacity and has made a commitment to recycle all steel beverage cans that it receives. Recycled aluminium cans fetch a high price, but are not widely used in SA.

While larger retail shops separate packaging material, some consumers separate waste and support recycling & home composting. Most recycling is done at the "end of the pipe". End of pipe recycling, is inherently cost ineffective because waste is first mixed and thus contaminated and then transported to the landfill where it is separated by salvagers in unsafe conditions. After it is removed from the landfill, it must still be transported to the end user. When generators separate at source, extra costs as well as salvaging are eliminated.

Industry related national recycling projects have been developed or are under development for waste oils and tyres. The oil industry has worked together to form the ROSE Foundation. Their goal is to provide a collection and recovery system for waste oils so that they can be reused or properly disposed.

Waste tyres are a major problem facing SA as large numbers of tyres are produced every year. Government and industry are working together to develop a national buy back system for waste tyres. The waste tyres will then be available for use in new products or as a source of energy for industries such as cement.

5.2 Creating value from waste: What is and what is not possible

A number of community based recycling projects have been established within municipalities in the rural areas of South Africa and funded by national government or other sources. Typically, these projects involve primarily salvaging at landfills. A goal of these projects has been to generate incomes for project participants. Studies of these projects have shown that the high costs involved, particularly for long distance transport, results in incomes that are extremely low. A study of such a project in Thohoyandou in the Limpopo Province showed that project participants could earn incomes of less than \$ 75 per year from full time work in reclamation which is not a living wage!

These projects have two fundamental economic flaws.

- Income is derived from the sale of salvaged recyclables only. The value gained by the municipality in reduced land fill costs is not seen as linked to the project and the reclaimers do not receive any portion of this value.
- In end of pipe salvaging, waste is first mixed at source and then transported by the municipality to the land fill where it then has to be separated and transported once again. The added costs, and lower income value, significantly reduce the revenue available to the reclaimers.

Thus, these projects are not only based on flawed business processes but are contrary to national policy and should not be seen or promoted as a solution to waste problems and are not sustainable from the perspective of poverty relief or income generation. Yet at the same time it should be noted that commercial businesses are making profits from recycling even in areas distant from your bigger recycling centres in South Africa because they are able to manage a more integrated business process based on:

- Long term contracts with end users
- Use of reclaimers working as so-called independent contractors
- Free access to landfills for the recyclables

6. CONCLUSION

It has been shown that there are a number of interventions which can significantly improve recycling rates and create a number of additional employment opportunities in developing countries. It has also been shown that solutions need not be sophisticated or high-tech. The one point which is however very important to take note of is that, in order to significantly improve recycling rates, Governments of developing countries, with support from the International Community, will have to play an active role in this regard.

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