

EXPLORING THE ECONOMICS OF RECYCLING NON-BIODEGRADABLE PACKAGING MATERIALS

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Paper Outline

- ▣ Introduction
- ▣ Waste Definitions and classifications
- ▣ Waste management
- ▣ Extended Producer Responsibility (EPR)
- ▣ Non-biodegradable wastes in pictures
- ▣ Different recycling processes
- ▣ Available equipment etc
- ▣ Paradigm shift
- ▣ Benefits of recycling
- ▣ Conclusions

Introduction:

Lagos

- One of the 36 states of Nigeria with 57 LGA/LCDAs
- Size – About 3577 Sq. Km (0.39% of Nigeria's 923,773 Sq. Km)
- Population of about 18 million people
- 2.5 Million household with 6% annual Growth rates
- Commercial hub of Nigeria & the West African sub-region



Map of Nigeria

Lagos

- By 2015, may become the 3rd largest megacity in the world
- PSP in waste management commenced in Lagos in the 80s
- Over 70% of the total industries in Nigeria are cited in Lagos
- Generate about 10,000 MT of waste daily
- The generation per capital (GPC) is put at 0.5kg/person/day
- A typical waste composition shows that over 50% are organic



Welcome to Lagos



Map of Lagos state

Waste Definitions and classifications

▣ What is waste?

- Waste generation is as old as human existence, it occurs as a result human activities in consumption and production.
- There are so many definitions of waste depending on who is defining it.
- Generally, wastes can be defined as substances or materials that are of **no further value or use** to its generator.
- It can also be said to be substances or materials thrown away or about to be thrown away by the owner or generator. – Out of sight and throw away culture.

Waste Definitions and classifications

▣ What is waste?

- The Basel Convention (Global convention on the transboundary movement of hazardous wastes - 1998) defined wastes as substances or objects that are disposed or are intended to be disposed or are required to be disposed of by the provisions of the National laws.
- To a recycler or an economist or an industrialist; Wastes is a raw material or resources in a wrong hand or wrong place.
- To a waste picker; waste is a hidden treasure yet to be discovered or waiting to be explored

Waste classifications

▣ Waste Types

- Broadly speaking, there are 2 types of wastes namely; general wastes (Non-Hazardous waste and Hazardous wastes).
- **General wastes:** These are also known as non-hazardous wastes, they are usually harmless and do not pose an immediate threat to man and the environment. G.W includes household wastes, C&D wastes, commercial waste, garden waste etc. G.W may however become hazardous if not properly managed.
- This is because most wastes in developing countries, especially household wastes are disposed in a comingled manner (dry cell batteries, Insecticides cans, Asbestos etc)

Waste classifications

- **Hazardous waste:** HzW can be defined as substances or materials that are injurious or harmful or dangerous (even in low concentrations) to human health, animals, plants and the environment.
- HzW can be in so many forms; it could be in solid, liquid, gaseous, effluent or powdery forms. Most time they are discharged by the industries as effluent, gaseous emission and solid waste. It could also be found in unsorted household waste, healthcare waste and from construction and demolition waste in form of asbestos.
- HzW could be explosive, flammable liquids, flammable solids, Poisonous-Acute, corrosive, toxic, & _with Radioactive properties etc

Waste classifications

- ▣ There are several classifications of wastes, however it is mostly classified by:
 - **Origin:** e.g Healthcare wastes, C&D wastes, MSW, Industrial wastes, agricultural wastes, nuclear waste etc.
 - **Form:** e.g Solid, liquid gaseous and powdery wastes.
 - **Properties:** e.g Toxic, explosives or volatile, carcinogenic, reactive, acidic and alkaline
 - **Legal Definitions:** These includes special, controlled, household and industrial waste etc where specific definitions or criteria are used.

Waste management

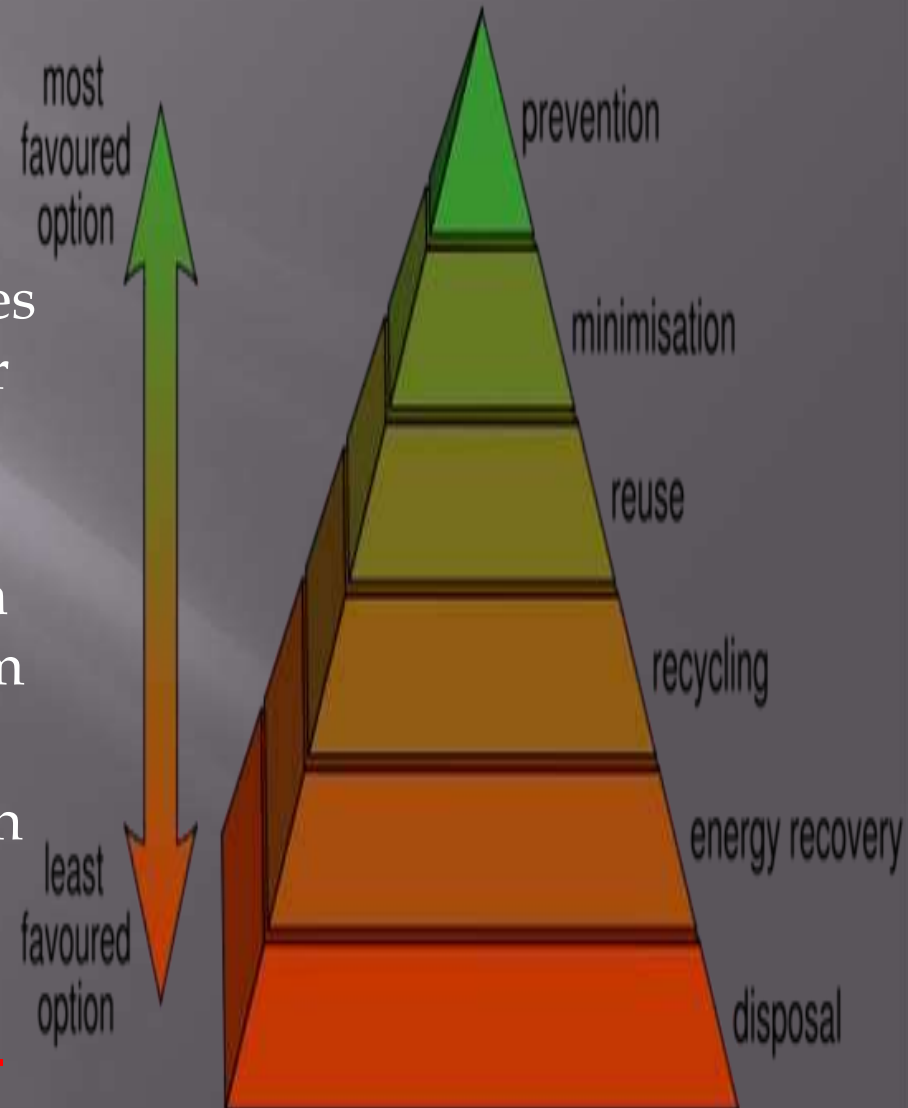
- **Waste management** can be defined as all efforts of humans including storage, collection, transportation, recovery, processing and disposal of all substances or materials that are no longer needed by the original generator.
- The Oxford Advanced Dictionary defines Management as the act or skill of dealing with people or situations in a successful way. Equally, Wikipedia defines Management as the act of getting people to accomplish desired goal and objectives using available resources efficiently and effectively, it includes *Planning, Organizing, Staffing, Leading or Directing and controlling* an organization or system for the purpose of accomplishing a goal.

Waste management

- It went further to describe **management** as a human action including designs to facilitate the production of a useful outcome for a system
- Therefore waste management can also be described as human actions including *Designs, Planning, Organizing, Staffing, Leading or Directing and controlling* an organization or system for the purpose of accomplishing a goals.
- The goals to be accomplished with waste management are;
 - ✓ To reduce the effects of waste on human health.
 - ✓ To reduce the effects of waste on the Environment.
 - ✓ To maintain and improve the aesthetics
 - ✓ And lastly, for resource recovery (Food, Raw-materials, Energy etc

Waste Hierarchy

- Waste hierarchy is one of the widely adopted WM concept
- It is supported and promoted by the UN, through the popular 3Rs (Reduce, Reuse and Recycle).
- The concept classify WM strategies according its ability to promote or encourage Zero Waste.
- The concept is hinged on the extraction of maximum usage of a product and to generate minimum waste.
- There are some new arguments on the hierarchy.
- Another widely adopted WM concept is **Polluter Pays Principle**.
- It also encourage resource recovery



Extended Producer Responsibility (EPR)

▣ What is EPR?

- It is a strategy designed to promote the integration of environmental costs(PPP) associated with goods throughout their life cycles into the market price of the products. (Thomas Lindhqvist , April 1992)
- It is therefore an environmental protection strategy to reach an environmental objective of a decreased total environmental impact of a product, by making the manufacturer of the product responsible for the entire life-cycle of the product and especially for the **take-back, recycling** and **final disposal**.
- The concept was first introduced in Sweden in the 1990s by L, T in conjunction with Swedish Ministry of environment.

The Goals/Benefits of EPR?

- ▣ The goals and benefits of EPR programs are numerous; below are just few:
 - It encourages producers to redesign their products (at source) for effective usage and recycling.
 - It helps to “avoid everyone’s responsibility is no one’s responsibility” – Someone must be responsible.
 - It ensures the recovery and recycling of packaging waste in the most economically efficient and Environmentally Sound Manner (ESM)
 - It supplements PPP & waste hierarchy through higher utilization of products & materials (3Rs)
 - Effective collection system.

Non-biodegradable Packaging materials



Non-biodegradable Packaging materials



Non-biodegradable Packaging materials



Non-biodegradable Packaging materials



Non-biodegradable Packaging materials



Non-biodegradable Packaging materials



Non- biodegradable Packaging materials

- ▣ Non-biodegradable packaging materials comes in different characteristics and types:
 - **Aluminums**: These comes in form of cans, aluminum foils etc. The demand for recycled aluminum is very high globally. - this is attractive because it takes 95% less energy to produce new aluminium can from an old can than from ore
 - **Plastics**: These are the commonly used materials for packaging, it includes PET (polyethylene terephthalate); HDPE (High- density polyethylene); LDPE (Low – density polyethylene) Polypropylene (PP), Mixed Plastics etc.
 - **Glass/ Bottles**: These includes beer bottles, soft drink bottles etc.

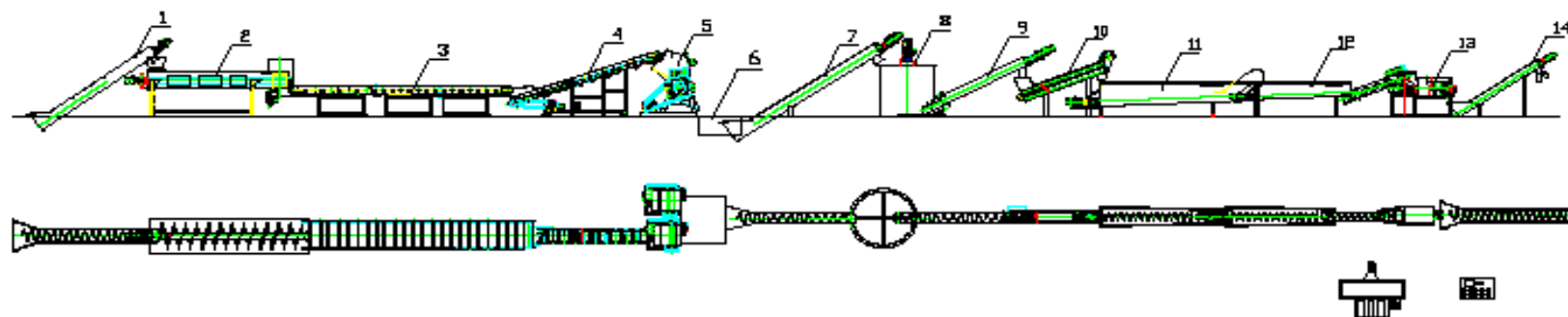
Non- biodegradable Packaging materials

- **Tetra Pak materials** : These are aseptic packages materials which contains different layers of plastics, aluminum and raw paper, they cannot be recycled as "normal" paper waste, but need to go to special recycling units for separation of the different materials.



Recycling processes – PET Bottles

1. Layout Drawing



2. Flow Chart

Process description: The process of this automatic production line for PET bottles crushing and washing is as following: Conveyer screw--- label and cap peeling machine---Crushing ---screw feeding--- Agitating washing boiler (hot water + chemicals) ----- screw feeding---- scrubbing washing ---- rinsing (01) ---- rinsing (02) --- spin dewater drying--- packing

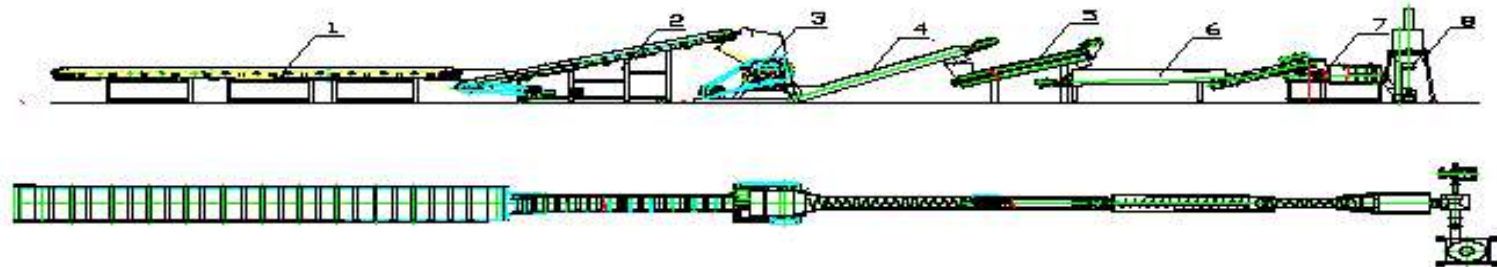
3. Machine description:

- | | |
|-----------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| 1. Conveys bottle flakes from the boiler to next machine | 2. Very high efficiency machinery that washes away the label, cap, mud, etc. |
| 3. PVC bottle and colored bottle separating platform | 4. Convey bottles to the next equipment |
| 5. Heavy duty crushing machines | 6. Convey bottle flakes from the boiler to next machine |
| 7. Hot water washing boiler gets rid of oil, further separate labels and wash away glue | 8. Convey bottle flakes from the boiler to next machine |
| 9. Friction washing machine, to further remove mud & Labels | 10. Screw rinsing machine |
| 11. Screw rinsing machine-2 | 12. Screw discharger conveys bottle flakes from the boiler to next machine |
| 13. Horizontal high speed dryer, automatically dry up bottle flakes | 14. Bagging screw, conveys bottle flakes to bag |

Recycling processes – Pure water sachets

PURE WATER SACHETS – FULLY AUTOMATED

1. Layout Drawing



2. Flow Chart

Process description: The process of this automatic production line for Pure water sachets (Nylon) crushing and washing and drying is as following:
Sorting belt--- Conveyor belt---Crushing ---screw feeding---- scrubbing washing ---- rinsing---- Spin dewater drying (01) --- Drying(02)---and packing



Recycling processes – Pure water sachets



PURE WATER SACHETS



RECYCLING MACHINE



RESINS (PLASTIC PELLETS)



EXTRUDING MACHINE



PRINTING MACHINE



CUTTING & SEALING MACHINE



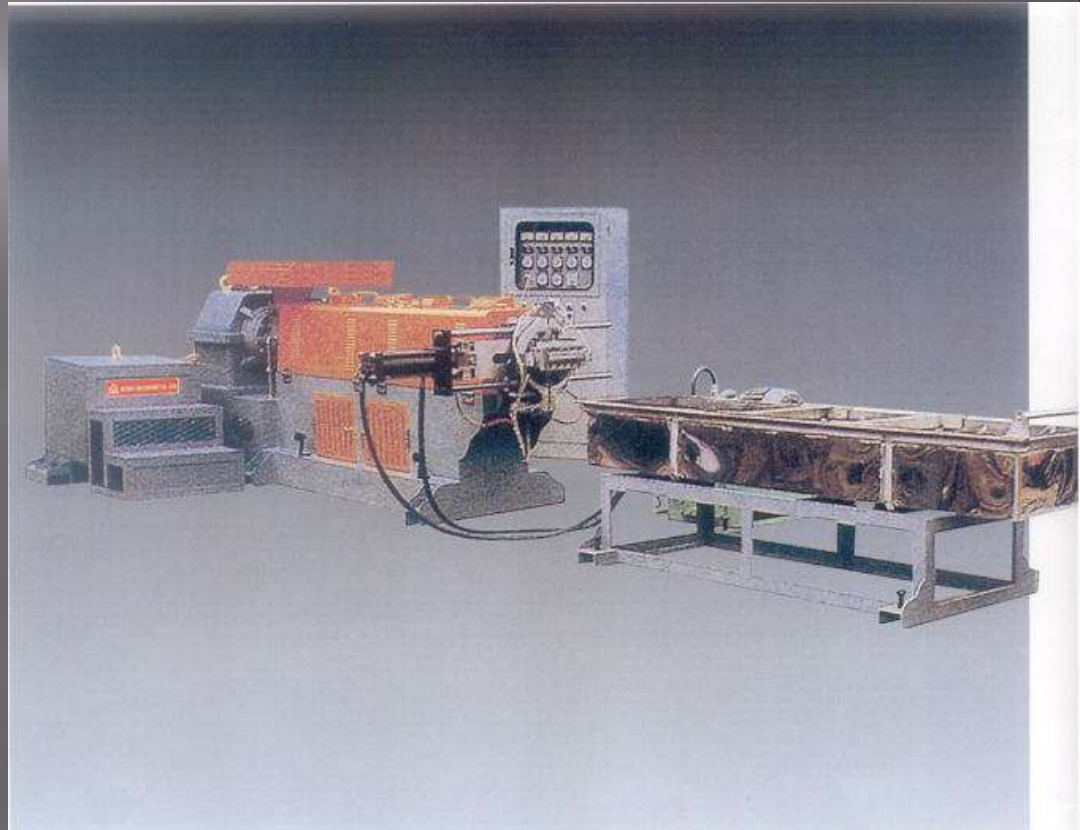
WASTE BAG



WASTE BAG

**COMPLETE PUREWATER SACHET
RECYCLING TECHNOLOGY**

Recycling processes – Pure water sachets



Do you know?



=



28 PET bottles = 1 T-shirt

Do you know?



=



670 Aluminum cans = 1 Bicycle

Do you know?



=



19,000 tins (steel) = 1 small car

Paradigm Shift

- ▣ The time for paradigm shift from the old way of seeing waste as a 'throw away materials' is NOW!
- ▣ Nigerian manufacturers (importers/ distributors) need to embrace the EPR strategy to ensure effective take-back, recycling, treatment and safe disposal of all end of life products manufactured by them.
- ▣ Manufacturers should begin to Think out of the box, in terms of products re-design, resource efficiency and the management of their waste packaging materials in the most economically efficient and environmentally sound manner.
- ▣ It is time to begin to see **cash** in our **trash**.
- ▣ Take note 'waste is not waste unless you waste it'

Paradigm Shift

- ▣ The manufacturers should begin to invest in technologies and equipment that will convert their waste into energy – Needed in their productions.
- ▣ The manufacturers should begin to fund effective collection of their packaging materials and end-of-life products for effective treatment and recycling.
- ▣ It is time for the establishment of recycling and treatment facilities in Nigeria to utilize the waste from the industrial sector.
- ▣ It may be possible for manufacturers to earn some income from Carbon Credits for reducing the volume of Carbon released into the atmosphere. ?

Recycling in other climes



Recycling in other climes



Recycling in other climes



Recycling in other climes



Benefits of Recycling

- ▣ The benefits of recycling non-biodegradable and other biodegradable waste products cannot be overemphasized. It encourages the adoption of both PPP and resource efficiency thereby ensuring fullest utilization of products. The benefits includes, economic benefits, environmental benefits, social benefits and health benefits.
- ▣ Non-biodegradable as the name implies or suggested cannot be land filled or burnt like other wastes without some attendant problems

Benefits...

▣ Economic benefits:

- Job creation, both direct and indirect jobs.
- It creates new line of Green businesses, such as transportation, resource recovery, processing and selling of recovered materials.
- Reduces the cost of production, through energy conservation, e.g aluminum production
- Reduces the cost of waste disposal
- Increased tax income for the government.
- Foreign exchange earnings

Benefits...

▣ Environmental benefits:

- Reduced pollution of the air, water and land/soil.
- Saves or reduce the exploration of the natural resources.
- It helps to prolong the life span of disposal sites.
- Reduces deforestation.
- Reduces the generation of Green Houses Gasses which are released to the atmosphere when wastes are burnt, thereby causing climate change and global warming.
- Recycling brings about green economies

Benefits...

▣ Health benefits:

- When plastics which is non-biodegradable in nature is burnt, it releases dangerous gasses like dioxins and furans that causes a lot of ill health like cancer, spontaneous abortion, lungs problems and several other diseases.
- Equally, when tyres are burnt, they also release several dangerous gasses too.
- Therefore when plastics are recycled, it saves us from some of these ill-health.
- Leachate from uncontrolled dumpsites are found to have polluted the underground water table thereby causing a lot of ill health.

Conclusions 1...

- ▣ It is pertinent to state that waste recycling activities are all sources of employment, job creation, wealth creation & distribution, foreign exchange earnings, poverty alleviation & reduction and environmental sustenance through reduction in the volume of waste to be landfill. Inline with United Nation's Millennium Development Goals (MDGs) of sustainable development of the environment and reduction of world poverty level to half by year 2015, the same year that Lagos may become the 3rd largest mega city in the world.



Conclusions 2....

- ▣ The government should also put in place enabling environment to support effective and sustainable waste management, including collection, transportation, recovery and recycling activities.
- ▣ The time for paradigm shift from the old way of seeing waste as a 'throw away materials' is NOW!
- ▣ Nigerian manufacturers need to embrace the EPR strategy to ensure effective take-back, recycling and safe disposal of all end of life products manufactured by them.
- ▣ Manufacturers should be socially responsibility (CSR)

Conclusions 3

- ▣ Advocacies aimed at institutionalizing sustainable recycling activities should be embarked upon by Government and all other identified stakeholders.
- ▣ Partnerships for sustainable development should be encouraged.
- ▣ Both government and all identified stakeholders should prioritize capacity development, through training and re-training of staff, study tours and exposures etc.
- ▣ Adequate funding should also be provided for recycling activities (Both Public and Private sector)
- ▣ Development of local technologies for effective waste management (Collection, storage, treatment, recovery and disposal) – My Cairo experience
- ▣ Think out of the box! – Government & the Private sector

Ponder on this!!!

I will like to leave you with these parting words – Ponder on them!

“The Environment is our commonwealth and heritage,
let us all preserve it by living right” – Adebola
Olugbenga

“It is whatever you give to the Environment, that the
Environment gives back to you” – Adebola O.

“Our lives begin to end the day we become silent about
things that matters” – Dr. Martin Luther King Jr.

“The time is always ripe to do what is right” – Dr.
Martin Luther King Jr.



Thanks for your attention!

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