كفاءة الموارد: استراتيجية حيوية لإعادة التدوير في مصر

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نبذة مختصرة:

تحظى الأرض بموارد طبيعية متنوعه ولكنها محدودة نسبيا ، والتي يجب الحفاظ عليها لمستقبل الأجيال القادمة ؛ و التركيز على تحقيق المزيد من التشغيل والجهد من جانب صناع القرار من القطاعين العام والخاص ، وكذلك المجتمع المدني ، للتخطيط الجيد واستغلال الموارد بجودة عاليه مستدامه، وهذا يتضمن النهوض بإدارة الموارد المستدامة من منظور دورة الحياة للمنتجات والخدمات والمخلفات .

لذا فان المنهج الحديث للعمل على كفاءة استخدام الموارد هو من خلال إعادة التدوير ،ومن خلال الحد من التأثير البيئي السلبي لجميع المنتجات في كل مرحلة ، من سحب المواد الخام والنقل إلى الإنتاج ، الانتشار ، الاستخدام والتخلص ، حتى يمكننا تحقيق المزيد من الرفاهية مع استهلاك أقل للموارد، مما يعزز قدرتنا على تلبية رغبات الإنسان مع احترام القدرة الاستيعابية لبيئة المحيطه ، وقد ركزت هذه الورقة البحثيه على تحديد دور المتغيرات الاجتماعية-الديموغرافية التي يمكن أن ترتبط بها سلوكيات افراد المجتمع مع اليه إعادة التدوير وكيفيه زيادة الوعي المجتمعي وتشجيعه لينعكس على سلوكيات اعادة التدوير في المجتمع المصرى .

الكلمات المفتاحية: إعادة التدوير ، برنامج إدارة النفايات ، تشجيع إعادة التدوير ، مصر

Introduction:

Recycling today is aimed at the gathering of recyclable material , such as glass, paper, metal, plastics, textiles and electronics, and the following removal of recyclable, valuable raw material from it,(Paul H Brunner ,2014) the limited quantity of the most usual resources and the unlimited thirst for the same has made reusing one of the most needed actions that encourage sustainability these days .

While recycling is wished-for decreasing waste and curb pollution, many recycling operations and productions actually end up funding meaningfully to environmental pollution.

Thus, today we need to phase out old-fashioned recycling skills and develop inexpensive, more efficient reusing operations.

Efficient and effective recycling needs the high scale participation of the general public to be successful. Any waste management program that does not involve the public is bound to fail. (Saman Rahimi R, 2016).

Recycling is the process of converting waste materials into reusable targets to prevent waste of potentially useful materials, reduce the consumption of fresh raw materials, energy usage, air pollution and water pollution (from landfilling) by reducing the need for "conventional" waste disposal and lowering greenhouse gas emissions compared to plastic production. Recycling is a must of modern waste reduction and is the third component of the "Reduce, Reuse and Recycle" waste hierarchy. (Devon William, 2016)

Actually , recycling of a material would produce a new supply of the same material ,for example; used office paper would be changed into new office paper or used polystyrene foam into new polystyrene (Tam, C.M. ,2006) ,so this is frequently tough or too costly (compared with producing the same goods from raw materials or other sources), so "reprocessing" of many products or materials contains their reuse in producing different materials (for example, paperboard) instead, another form of recycling is the salvage of certain materials from complex products, either due to their essential value (such as lead from

car batteries, or gold from circuit boards) or due to their hazardous nature .(Paul H Brunner ,2014)

Literature Review:

The aim of the hierarchy is to help people choose how to deal with their generated waste in a way that maximizes best environmental outcome. This involves waste minimization, reuse, recycling and energy recovery as preferable to the responsible disposal of unavoidable waste, an important element of the hierarchy is that individual actors are brought to the center of the waste management system because they are expected to take responsibility for the everyday waste they generate and dispose of. However, the management of waste in industrialized societies is not linear. (Dr. Tarek El Robby, Ex- Deputy-Minister of Environment), as can be seen in Figure (1) bellow, it represents a complex web of different actors, interests and socio-technical processes.

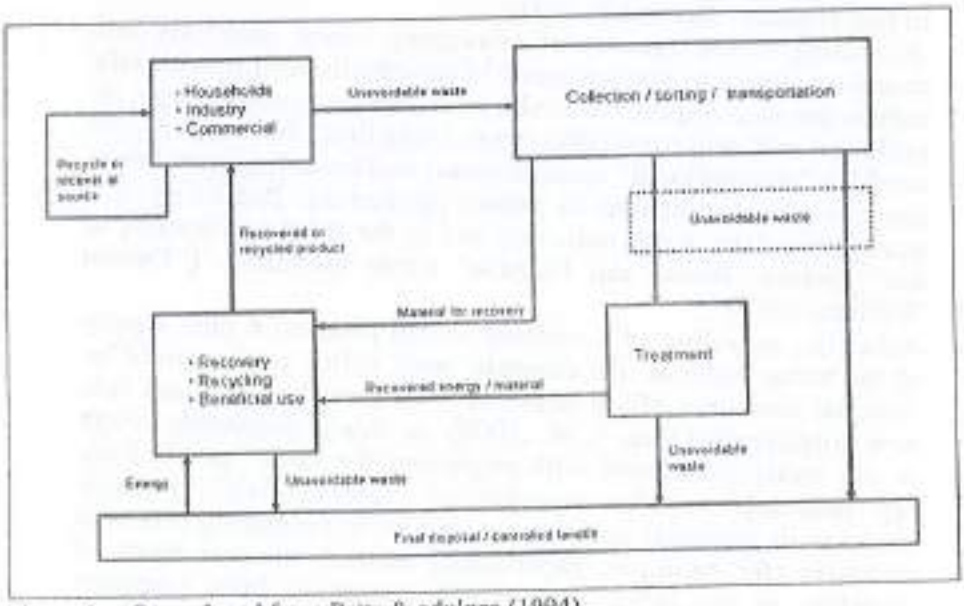

Figure 1 : Reproduced from Petts & edulgee (1994)

1. The history of recycling:

Despite common beliefs, the history of recycling goes a long way back. Recycling is not a new concept, and the practice of recycling has been around for thousands of year. However, it has been affected predominantly by supply and demand, much as it is today.

i. Historic Times:

Recycling has a history that dates back to the previous historical times. Since the early times around 400 BC (and even earlier), individuals have been recycling. For example, archaeological indication shows that glass from the imperial Byzantine eras was recycled in the ancient city located in present day Turkey. There is also evidence that early Romans recycled bronze coins into statues that could be sold at a greater monetary value than the original value of the coins. In tough times (wartime), metals from everything (e.g. like jewellery and coins) were being melted for weaponries or other essential goods. Also, pottery recycling operations have been discovered. Archaeologist deduced from waste remnants that recycling was a prevalent practice throughout times of distress such as famine, war and widespread illness. During these times of suffering, new materials might have been scarce, making the recycling of waste indispensable. (15)

ii. Pre-industrial Times :

Before the industrial revolution, recycling and collective household re-using was really a mutual place practice, before mass production flooded the market with loads of materials and products, it was usually cheaper to reprocess items instead of buying new ones, and when materials did become damaged beyond further use, recyclable ones (e.g. glass, aluminum) were recycled into new items. (11)

For instance, evidence shows that scrap figure and other metals were collected in Europe and melted down for continuous reuse.

In Britain, dust and slag from wood and coal fires were being downcycled as a row material in brick making. let's say, during these period in the history of recycling, it was essentially encouraged by the economic benefits of using recycled goods instead of virgin material.

iii. **Industrial Times:**

The history of recycling took a turn during the times of industrialization, as it became easier and cheaper to produce goods (through technological revolution and mass production), it also became easier and occasionally cheaper to throw used stuffs away.

On the other hand, anytime there was a massive economic crash, people would look for ways to make the most of what they had. For instance, during the Unlimited Depression, people reused and recycled materials because they could not afford to buy news items or get virgin materials. (8)

iv. **World War II (WWII)**

A highpoint in the history of recycling was throughout World War II, During the war, financial constraints and massive material lack due to war efforts made it obligatory for our ancestors to reuse goods and recycle materials, The war efforts demanded much of the resources, leaving little for the home front, Some items (e.g. metal, rubber and even certain food items) had to be rationed as they were needed overseas at the war front. So It became necessary for most homes to recycle their unwanted, as recycling offered an extra source of materials , there was also a general patriotism in recycling at that time. (7)

There were massive campaigns in many countries, urging people to bestow metals and conserve fiber, in contribution to war efforts and as an expression of patriotism. Recycling materials to be used at home also meant more resources could be sent

overseas at the war front. This meant a greater chance of victory at war.

v. **Post-WWII Recycling**

As with the other periods, after the WWII period, the history of recycling was greatly prejudiced by economic reasons, when the war done, resource conservation programs established throughout the war were continued in some states without an plenty of natural resources, such as Japan. However, for other countries such as the USA, recycling efforts were largely forgotten , In the 1940s and 1950s, when landfilling became a low-priced way to dispose trash, recycling was less common, nonetheless, in the 1970s, recycling became more popular again, and drop-off recycling centers were established. The environmental movement had started since 1960s, and there was greater public awareness and rising environmental consciousness. (9)

A breakthrough in the history of recycling was the introduction of the universal symbol for recycling , In the form of a Mobius strip, the symbol was planned by Gary Anderson in the late 1960s,after a Chicago-based recycled-container company sponsored an art contest to raise environmental awareness , Since then, the triangle has been used to signify the recycling hierarchy of reduce, reuse and recycle , The enlarged interest in recycling in the 1970s was also an outcome of expanding energy costs. Significant savings were achieved through recycling. (19, 16)

For instance, reusing aluminum needed only 5% of the energy required with virgin production, there were also important energy savings when recovering glass, paper and metals as compared to extracting the raw materials, at the beginning of 1970s, Rose Rowan started with the idea of towing a "recycling" trailer behind a waste management vehicle to collect trash and recyclable materials together, this improvement allowed for the introduction of curbside collection in the late 1980s and 1990s, which made it even easier for people to recycle. For the United

States, the first city to mandate recycling was Woodbury, New Jersey, many towns and cities rapidly followed suit, and today many cities in the U.S. make recycling a must.

vi. Sustainability and waste management

For waste management to become sustainable, it needs to be environmentally efficient, economically affordable, and socially acceptable. Environmental efficiency requires that the overall environmental burdens of managing waste be reduced, both regarding consumption of resources (including energy) and the production of harmful emissions to air, water and land. Economic affordability requires that the costs of the waste management system be acceptable to all zones of the community served; including householders, business, industry, institutions and government, Social acceptability obliges that the waste management system meet the needs of the local community, and reveals the values and priorities of the society. (Dr. Tarek El Robby, Ex- Deputy-Minister of Environment)

2. List of materials that are recyclable:

People have and use Few items each day are not recyclable to some degree like clothes , dishes, silverware and other goods are chosen because they can be used, cleaned and then reused many times, other things can become multi-tasking recyclable products ,instead of clearing the plastic container of dishwashing detergent and then discarding, use the container as a wash bucket or tool container ,but many other items often sent to landfills can be recycled as well.

Metal: all product of metal can be reprocessed, scrap steel is America's most recycled metal, It's the most used metal in the country, and it's needed to create new steel, copper, lead, aluminum, gold and silver are also reused, it's more useful to recycle these metals than to mine and upgrade them, for aluminum, it takes six times more energy to produce an aluminum can from row aluminum than from a recycled can.

Glass: all kinds of glass can be recycled, some collection spots want separating clear glass from brown, green or other colors, but all of it can be reclaimed, saving landfill space and the energy needed to produce new glass, and making new glass goods more reasonable. When everything else in a landfill has decomposed, rusted, corroded away or otherwise been transformed to primary form, glass will still be there, almost as perfect as the day you tossed it out.

Paper: manufacturing new paper from used paper is more energy-efficient than making new paper from wood, produces far fewer ecological effects than pulping wood and saves landfill space, most all forms of paper can be recycled, such as newspaper which can be recycled and can easily be remanufactured back into newsprint, other easily recyclable papers include phonebooks, junk mail, cardboard and pasteboard, magazines, envelopes. (4)

Plastic: because of high cost, weight and the variety of shapes, hardness, flexibility and other specifics of plastic, it's used to manufacture countless numbers of products, plastic is totally recyclable, though some polymers are more suited than others. Since 1988, many plastic products have a plastic resin code molded onto them that identifies if it was made from recycled materials and the type of plastic used in its manufacture, this code used as a guide to recyclers as to how suitable it is to be recycled.

3. Cost– benefit analysis:

There are some discussions about the economic and Environmental effectiveness of recycling , as dumping 10,000 tons of waste in a landfill produces six jobs while recycling 10,000 tons of waste can generate over 36 jobs, However, the cost effectiveness of creating the additional jobs remains unconfirmed, according to the U.S.' Recycling Economic Informational Study', there are over 50,000 recycling creations that have created over a million jobs in the US , two years after

New York City declared that implementing recycling programs would be "a drain on the city." New York City leaders understood that an efficient recycling system could save the city over $20 million. Municipalities frequently realize fiscal benefits from employing recycling programs, largely due to the reduced landfill outlays. (21)

A study presented by the "Technical University of Denmark" according to the Economist found that in 83% of cases, recycling is the most efficient technique to dispose of household waste, However ,there was an assessment in 2004 by the" Danish Environmental Assessment Institute" determined that incineration was the most effective method for disposing of drink containers, even aluminum ones (table 1)

Environmental effects of recycling

Material	**Energy savings**	**Air pollution savings**
Aluminium	95%	95%
Cardboard	24%	—
Glass	5–30%	20%
Paper	40%	73%
Plastics	70%	—
Steel	60%	—

Table: 1 Environmental effects of recycling

Some data about recycling process outputs in U.S.A:

- There were about 544,000 Trees saved when every household in the United States exchanged just one roll of virgin fiber paper towels with 100 percent recycled ones.
- There were about 20 million Tons of electronic waste thrown away yearly , one ton of scrap from discarded computers contains more gold than can be produced from 17 tons of new gold.

- There were about 9 cubic yards of landfill space saved by reusing one ton of cardboard.
- There was $160 billion Value of the global recycling industry that employs above 1.5 million people.
- There were 79 million tons of waste material diverted away from disposal in 2005 through recycling process.
- About 5 % Fraction of the energy it takes to recycle aluminum against mining and filtering new aluminum.
- About 315 kg of carbon dioxide not released into the atmosphere each time a metric ton of glass is used to create new glass products.
- About 98 % of glass bottles that are refillable, 98 % of those are refunded by consumers for reuse.
- About 51.5 % of the paper expended in the U.S. that was recovered for recycling in 2005.(22)

So according to these facts about recycling in the developed countries like U.S.A, it is clear now that there is a need for it in developing countries like Egypt.

4. The benefits of waste management:

The human waste production increased since the beginning of 20th century which has needed quick steps in recycling technology, In developed cultures, virtually all waste – local or industrial – is reused through a recycling process to extract all possible recyclable materials from it, This is not only economically efficient, but more essentially, decreases the need for landfills and the environmental stress they cause.

Recycling is a vital component of recent waste management practices, It forms an important part of the 3R concept or waste disposal hierarchy of 'Reduce, Reuse and Recycle', It can vastly reduce pollution and environmental pressure, At the same time, recycling has appeared as a veritable industry in its own right recently , generating employment for a lot of people across the world.

Recycling is a kind of training as we all know we should do it, but not all of us do it as usual as we should, and some of us

don't do it at all. However, there are lots of causes why you should make an effort to recycle as much as possible. If you haven't been observant about recycling your garbage, here are seven moral reasons why you should begin:

It cuts back on global warming: Our planet is starting to feel the effects of global warming already, and we need to do whatever we can to lessen the impact. Production of certain materials from scratch can release substantial amounts of CO2 into the atmosphere. Aluminum production is a prime example—producing new aluminum creates 95% more CO2 than recycling old aluminum cans. (12, 19)

Besides, recycling paper saves trees as for each ton of paper reused 17 trees are saved, each tree can extract around 250 pounds of carbon dioxide from the air per year.

It saves our landfills from overflowing: We're fast running out of space for landfills, especially close cities, Seaside cities have been leaving rubbish into their oceans for decades to avoid the problem, but with widespread marine ecological failure, this is no longer a possible option, it's difficult to find land in suburban and rural areas whose citizens will allow landfills to come into their areas without a battle , The squeeze for landfill land is only going to get worse in the future.

Recycling gives us some hope for this miserable scenario: Studies show that 60% to 75% of garbage in landfills can be recycled, that means that if everybody recycled, we'd have 60% to 75% less garbage in our landfills, and we'd need at least that much less land for garbage clearance.

It creates us more energy- efficient: It regularly takes a great deal to create something from scratch than to recycle it, for example, it costs twice as much energy to burn plastic as to recycle it; it takes 64% more energy to create paper than to recycle it, and recycling just one pound of steel can save enough energy to run a 60-watt bulb per day. (2, 10)

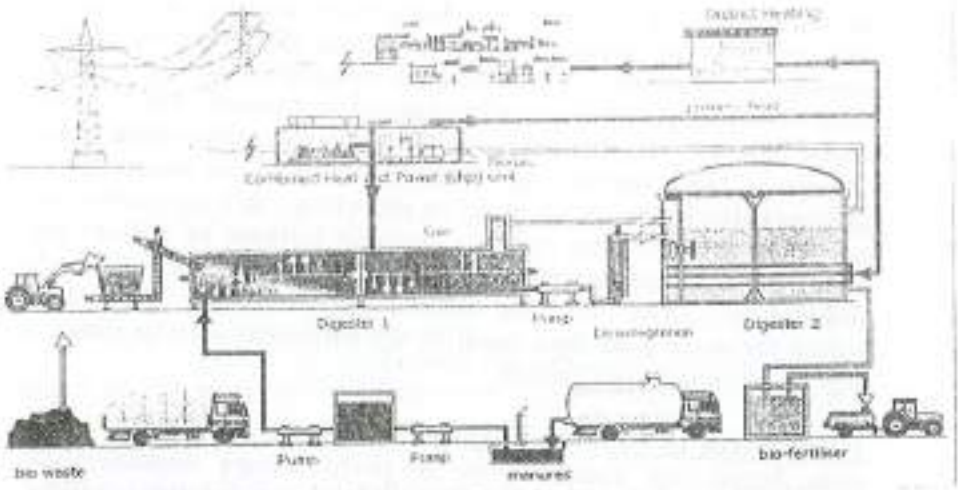

Figure 2 : recycling process
Source:https://fa.oregonstate.edu/sites/fa.oregonstate.edu/files/recycling/resources/MR_Class/chapter_4_recycling_processes.pdf

It improves the quality of our groundwater: The garbage in landfills is usually not treated in any way, it's simply thrown in a big hole and buried over, the most of this garbage is not environmentally kindly or willingly biodegradable, and there's no wonder that pollutants can get into our water, Rain and other runoff from landfills gets into our rivers, lakes, and other streams, destructive fragile ecosystems, It's also a main reason why it's not safe to drink from different waterways when you're hiking and camping, even when it seems you're in a virgin environment. (17, 6)

Recycling decreases the waste in landfills, and the more we recycle, the more our water systems can start becoming as clean as they look.

It decreases air pollution: Many factories that create plastics, metals, and paper products release toxins into the air, recycle these materials, and there will be fewer need for companies to

manufacture new resources, saving on the amount of pollution dumped into our atmosphere, in addition, disposing of certain ecological materials can also produce weighty pollution.

For example, plastics are often burned in burners. Plastics are made with oil, and that oil is released into the atmosphere when the plastic burns (producing main greenhouse) gas emissions.

It generates jobs: in all steps of recycling , it's no secret that recycling is a growing industry, gaining billions of dollars per year , our need to recycle is only going to raise more serious as populations grow, and as technology variations, Recycling forms far more jobs than landfills do sufficient jobs to make a big variance in a small town.

It improves to property value: It's clear that a landfill close your home can reduce your property values considerably; recycling decreases the amount of land wanted for landfills. This diminishes the number of houses near landfills, keeping property values up and owners happy, so the more people recycle, the less landfills we need, and if enough people pitch in, recycling should pay off for everybody. (4, 7)

Figure 3 : recycling - ideas
Source:http://www.boredpanda.com/plastic-bottle-recycling-ideas/?image_id=plastic-bottles-recycling-ideas-11.jpg#topcategories

Research problem:

This paper focuses on the relationship between people and the waste, they both need to discard in everyday life, there is a need for a complete rethinking of "waste" - a rethinking that calls for waste not to be called waste at all! There is a clear need for the current approach of waste disposal that is focused on municipalities and uses high energy/high technology, to move more towards waste processing and waste recycling that involves public-private partnerships, aiming for eventual waste minimization - driven at the community level, and using low energy/low technology resources , thus to improve the existing practices of waste recycling, this paper focuses on the following objectives:

1. Annalise the cost–benefit of recycling.
2. Determine to what extent recycling can be applied by everyone in Egypt.
3. Suggest some methods for decision makers in Egypt .

Research Methodology:

The study depends on qualitative research , This means studying things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them, the emphasis is put on the natural setting and the points of views of the research participants (Pernecky, 2016).

So the researcher depends on the Phenomenological mode which Describing how any one participant experiences a specific event is the goal of the phenomenological method of research, This method utilizes interviews, observation and surveys to gather information from subjects, Phenomenology is highly concerned with how participants feel about things during an event or activity, so data is collected in textual form on the basis of observation and interaction with the participants e.g. through participant observation, in-depth interviews with some figures (such as Dr. Tarek El Robby, Ex- Deputy-Minister of Environment , Dr. Mohamed Ibrahim Mohamed Ibrahim,

Department of Architecture, Faculty of Engineering, Menoufiya University, Shibin El- Kom , Dr. Nanis Abd El Monem Mohamed, Architecture and Housing Institute, Housing and Building National Research Centre, Giza). This method provides advantages over other data collection methods ,it includes (Accurate screening, Capture verbal and non-verbal questions, keeping the interviewee focused and on track to completion, Capture emotions and behaviors), Besides focus groups with some domestic companies(such as Eggersmann GmbH company , Distributor in New Maadi)

Recycling in Egypt:

There is growth in Egypt's population by more than a double and a half over the last years, the rise in population bulk in urban areas, especially in urban cities, and the change in the consumption forms in urban and rural areas alike, many weights on the environment and public health have aggravated, including the solid waste problem, whose harmful marks became clearly evident throughout the country, existing conventional waste controlling systems have become unable of meeting society needs with its unlike groups, in terms of maintaining a rational level of cleanliness, controlling health threats and adverse environmental effect and providing a commonly civilized appearance for the country, total waste quantities gathered never surpassed in the best situations 77% of the wastes generated. Great amounts of wastes piled up in streets and available areas between buildings, besides the spread of informal dumpsites in a number of essential areas, open burning as a means of waste disposal has become one of the core sources of air pollution in Egypt.

The Solid Waste Management National Strategy for Egypt:

The ministry of state for environmental affairs has completed the progress of the Solid Waste Management National Strategy for Egypt, with the resolution of establishing an effective national system for the Integrated Solid Waste management. The aim of the strategy is to present the essential growths in the recent national system and is based on two main factors:

First: the sound removal of gatherings, remediation of waste dumpsites and providing suitable sites for the final disposal of wastes.

Second: forming the required system based on integrated measures, including at source reduction, storage, collection, transfer, recovery and safe disposal of wastes for all rural and urban areas in Egypt.

Municipal Solid Waste System Guideline was advanced, including the for solid waste management legislative structure the provisions of laws, legislations, crimes and penalties; special guidelines for handling some stages of the municipal solid waste system; in addition to definitions related to municipal solid waste system and its components.

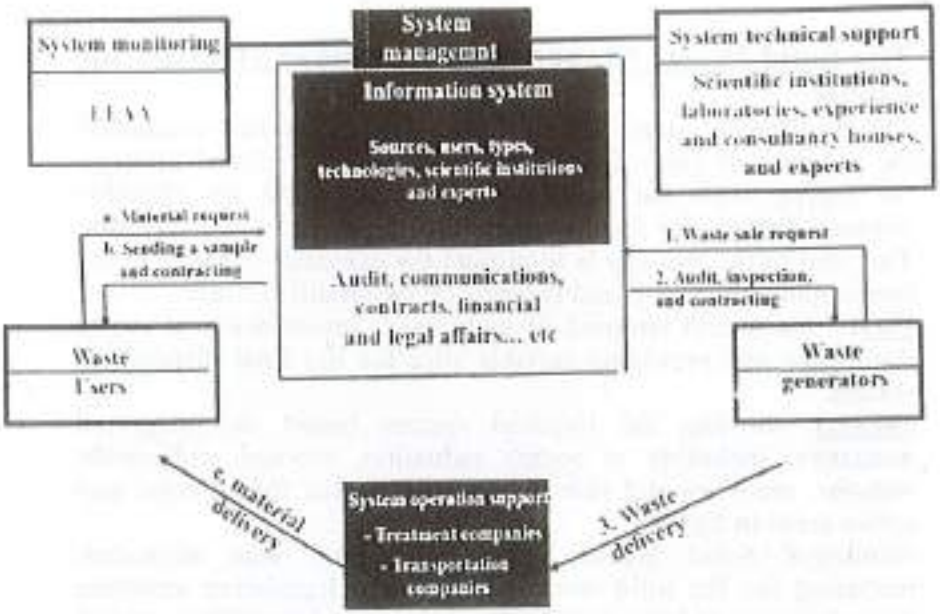

Fig 4 : Information and Waste Management System in Egypt.
Source: Ministry of environment

So Egypt is one of the most promising and virgin market in the field of recycling & alternative energy projects.
Researchers estimated that the value of investment in that field will provide about 25 billion dollars annually, the value of selling price for cans scrap ton is estimates with 1000 $ while the carton tons estimated at 300$
According to world bank data, solid waste management cost in Egypt annually, ranging between 32.4 and 37.3 million dollars.

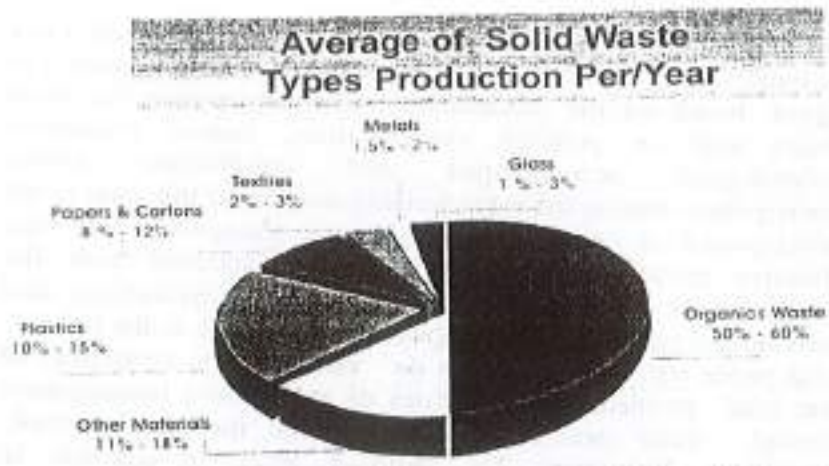

Fig 5 : average of solid waste types production per/year in Egypt ,2017.
Source : http://www.egy-wasterecycling.com/m/Pages/Index/3/egypt-marke

Most Major Challenges Facing Solid Waste Management in Egypt:

- Increasing public environmental awareness and overcoming wrong wastes handling practices
- Erasing old accumulations in the various cities and villages in Egypt and their disposal in environmentally and health safe locations.
- Confiscating informal and open dumpsites.
- Eliminating the approaches of burning the wastes, commonly agricultural trashes.
- Realizing an overall, integrated and sustainable policy for solid waste management, keeping the harmony between its stages and modules and ensuring smoothness of flow and operation.
- Narrowing the spotting and control of private waste suppliers to complete waste management in the various governorates.

Conclusions:

The future image contains the establishment of an effective national system for combined civic solid waste management in Egypt, based on the advancement and developing the main basics such as policies, organizations, human resources, technological ,infrastructure and enlightened public participation, among the most weighty outputs of this plan is the development of an upgraded legislative framework and new effective governmental administrations, associated with the establishment of capacitated private sector institutions and activating nongovernmental organizations to work in the field.

This paper also does emphasis on rising public awareness of that vital problems and solutions of solid waste management through most used & effective social media (Facebook, WhatsApp ,Instagram, TV, radio & etc.), in addition to developing human resources and building prepared qualified centers for education,researching, development and training, to form the core base of experts and qualified labors.

Recommendations

According to all facts discussed above, I can focus on some methods to encourage and to support recycling in Egypt , as The more people that are boarding with recycling, the better our world will remain to develop ,so these methods can be applied by government ,private sector ,and all people with different ages to be like an attitude in our society.

High awareness everywhere:

- Arrange a meeting to confirm employees about the benefits of recycling and participate in a workplace recycling program.
- Construct a permanent resource like a bulletin board or a bookstand in the lobby for employees to mention whenever they want, Keep the information up-to-date,

easily available and replace it continuously with new materials.

- Keep road of the statistics by weighing the amount of trash you have reused and marker the number of pounds your office is recycling weekly, that will help employees put their helps into perspective.

Provide motivation:

- Making office recycling like a game by offering a reward to the office team that makes the least amount of trash and the most recyclables , at least, it will get those who might not have been interested to be in , so gift cards, movie tickets, or even just a candy bar make great rewards.
- Inspire employees to begin recycling at work and at home for an even bigger return because People who already recycle at home may help other employees even harder to get involved.

Keep challenge

- Make it suitable for employees to participate, Make sure the recycling bins are abundant and clearly marked, Put them in several areas such as (office, cafeteria and break room).
- Encourage the boss to enlist other "green" efforts throughout the office that don't require much time or energy, administration can easily buy energy efficient light bulbs, low-flow toilets and recycled paper as a few examples, These small changes can also have a big influence on the company's bottom-line.
- Choose assistants to keep the workplace recycling program running, giving those who desire to contribute a dynamic role, The simpler it is for some, the more likely they will remain to participate.

Operations:

- **Add Recycling Bins in Public areas:** Improve your city or town's core waste service by putting a recycling choices everywhere in your parks, on your paths, or at your transit stops, mainly the waste bin encourages residents to suitably arrange their recyclable waste.
- **Target non- recyclers:** consider targeting a recycling message to a certain community, learn from your boarders where the empty bins are often located; influence the voices of community leaders to spread the expression; use public space to advertise (side of recycling vans and bins, bus stop notices, sides of buses); understand the hostilities or barriers to recycling and how to report them with your community in mind.
- **Estimate the business economy side of recycling:** Identify the inputs and outputs of your databases how troops handle equipment ,equipment cleanliness, contaminants entering the waste stream, level of support from staff; markets and demand levels, such as (New generation for recycling in Alex) figure 4:

Figure 6 : New generation for recycling in Alex(new ideas)

Communication:

- **Community newspapers as communication Trucks:** Share success by explaining the benefits of recycling, share

details about the recycling supply series, put stickers on cars, buses & all transportations.

- **Educate the Community** : Use social media or a website to support recycling programs and rise participation, share valuable information with residents about usual recyclable materials, and provide contact information for public space waste questions, as they are a part of the overall effort, and support recycling regulation.
- **Goals and Benefits:** Set goals and return on recycling for residents to encourage them, such as buying waste from people via money as an income for them or exchange it with discount offers at different stores.

New Programs everywhere:

- **Focus on schools:** children are often the strongest change agents so putting the estates at an early age will encourage recycling actions regardless of location (figure 5).

Figure 7: new programs at schools

- **Create community drop off locations or events:** Stage risky materials (paint, medications, and chemicals), paper grating and recycling festivals, beach or park clean-ups, be sure the sites and events are obviously

labeled and easily available. Keep track of how abilities and events perform and ensure adequate accommodations to face community demand, and reflect locations like fire and police station parking lots to base gathering bins.

- **Consider a collection co-operative:** Work with neighboring towns to pool materials, increase recycling, and efficiency of scale.

Logistics:

- **Focus on efficiency**: Design well-organized collection routes that might be added with collection from all sectors (puplic & private) to decline usage of the most expensive parts of a recycling program (labor, fuel, and equipment).
- **Adjust collection techniques**: estimate recent operations and plan for the future , add new materials to the recycling program, control technology which allows to plan ways efficiently .

Limitation and further research

This research is qualitative research and it applied on a certain country (Egypt) , so the researcher suggests that the future studies can be quantitative ,or comparative study between Egypt and another country.

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