

## Review Article

# Impact of Process of Urban Solid Waste Separation Plan in Origin on Urban Waste Management in Metropolises of Developing Countries

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## A B S T R A C T

Waste management is an issue that seeks to improve the social life of humans and enhance their interaction with the environment. The environment is a large and complex collection that is caused by the gradual process and evolution of living creatures and constructive components of the Earth's surface. So it affects human activities and is affected by it. The relationship between man and environment has always been a function of his behaviour; this behaviour has taken different shapes over the centuries and is increasing day by day. Thus, the people from the beginning of the life, are always turning the wastes away out of their living environment in a way that due to the low population of one hand, the quantity and quality of the wastes, on the other hand, had no difficulty with disposing of the garbage, many of the materials that called wastes were recycled or disposed around the human settlements were landfill, inside them but with the increase of population and growth and expansion of urbanization, change of consumption pattern and extensive use of substances that are not easily accessible, the complications of unsanitary disposal and recycling of waste materials were revealed and then management of these materials was begun in a coherent manner. On the other hand, it is concluded that the separation process of solid wastes from the origin of production should be carried out by continuing training, culture-making, and information to citizens. In this article, the separation of solid wastes from the origin and its effects on urban management has been studied and at the same time its effects on urban life and the role of people in urban management also have been considered.

**Keywords:** Separation From Origin, Waste and Urban Management, Dry Waste, Recycling, Economic and Environmental Impacts, Metropolis

## Introduction

Today, waste management is one of the most essential axes of sustainable development, and waste collection and disposal in a way that reduces the risks to human health and

environmental damage; is important. The characteristics of sustainable development can be considered in four social, economic, fundamental, and environmental groups.

The production of various types of waste in human life

is inevitable, and without a doubt, not paying enough attention to this issue can have a great impact on the destruction of the environment and nature.<sup>11</sup>

The production of various types of waste in human life is inevitable, and without a doubt, not paying enough attention to this issue can have a great impact on the destruction of the environment and nature. Waste is the result of inefficient use of natural resources since humans have focused on a concentrated life in the form of modern societies, the issue of waste has become an important subject, the main reason for this issue is the difference in quantity and quality of produced waste that is very different from previous periods.

Waste is considered as one of the important sources of pollution in the metropolis and its lack of correct management can play a significant role in the occurrence of the urban environment and humanitarian crises on another side, one of the most important problems of urbanization especially in the metropolis is the growing trend of waste.

To solve this problem, action must be taken to reduce or return these materials to the production cycle, otherwise we will encounter environmental problems in future. Municipal Solid Waste Management (MSWM) system has been classified into eight parts, and the main reason of this classification is to determine and separate the tasks of each of these process.

Reduction at the production source, process and storage management at the site, transportation, collection, process, recycling, final disposal and care after excretion, that is called functional elements, they are bound to each other like rings of a chain and each of them plays a major role in the waste management system which should be considered by their performances.

Separation of waste from the origin is an important step in the proper implementation of the waste management plan, the low participation of citizens in implementing the important project, despite the economic and environmental benefit, needs comprehensive review, systematic training, and planning. Separation of garbage in developed countries has become a common practice by citizens and as a result of culture-making and assiduity, people help this process voluntary way, therefore, recycling issues including in the form of the energy-producing units and types of fertilizer has found its independent economy.

However, in such circumstances, the lack of supervision on the general process of waste production, encouraging and deterrent limited rules and regulations in the field of waste management, especially the lack of continuous notification and inadequate training, is proposed by experts still among the most important challenges in the implementation of the principles of Systemic Waste Management (SWM) in some developing countries.

The major part of municipal waste is organic materials and the share of solid wastes is increasing compared to the total produced. Urban waste management depends on factors such as the production of wastes, collection, transportation, landfill, and recycling, so the scope of this issue is very broad and variable, for such a subject there is not any way expect strategic plan and management.

The waste separation plan from origin, which is one of the most important factors of practicing the waste management, needs to culture making and all - sided training, unfortunately, the citizens are not aware of the benefits of the waste separation plan from origin, which there must be a fundamental thought for their awareness, and this issue should be taken seriously at all levels, especially the basic education system.

One of the new features of waste management system is separation of waste from origin, urban waste management planning can have significant effects on the advancement of separation from origin purposes. The success of this system depends on the participation of all people in the separation of waste from the origin.

### **Statement of Problem**

Urban solid waste management is a fundamental environmental problem in human societies in all developed and developing countries.

Urbanization growth in developing countries and increasing the level of welfare and consequently more consumption of goods and services led to waste production increase.

The increase in urban waste production has created a serious need to pay more attention to the manner and shape of its management form, in such a way that the estimates indicate the increase in waste production in these countries are in the future years.

The separation from the origin is one of the plans that its implication is very important in regard to development and management of urban waste and reduction of health and problems due to accumulation and improper disposal of urban waste.<sup>7</sup>

The separation of wet and dry wastes from the origin is one of the most important rings chain of recycling and exploitation of waste, should be seriously considered and the necessary facilities should be provided for doing it. The necessity of healthy life requires a continuous improvement in urban and rural management methods. Unfortunately, today, unsanitary disposal of waste in the cities and the impacts caused by the ever increasing and irregular discharge of waste will cause damage to nature, which facing-citizen with many problems.

The implementation of the waste segregation scheme from origin causes the waste to be separated at origin

and garbage directed to compost factories and convert to organic Fertilizer without entering the environment, that this kind of fertilizer is best for the region's agricultural and the solid and dry waste transfer into recycling plants and by a process convert to recycling materials, including paper, pen, notebook, and handicrafts.

The method of urban waste management in developed countries is based on maximizing the waste separation at the source or origin and benefiting from the recycling method with regard to the various financial and environmental benefits of recycling, somehow in some countries like Switzerland and Germany, a huge part of the waste are recycled, whereas in developing countries, an important part of waste management efforts is focused solely on improving the collection system and final disposal methods, which are sometimes unprincipled disposal of urban waste without sufficient attention to the importance and necessity of recycling, that in addition to the loss of national capital could lead to more depletion and harvests of natural resources and environmental pollution.

The special conditions of urban waste in developing countries and the climatic differences of the country along with cultural and lifestyle issues have caused the management of urban waste in these countries be quite different from the in developed countries. Recycling is a process that can be performed in any of the waste management circles, but technically and economically, the most appropriate method of recycling is to use the method of waste separation at the source or origin of production.

One of the effective methods in urban waste management system is to pay attention to the issue of recycling, which itself largely depends on the degree of separation from the origin of the waste. Therefore, can be said that separation from the source of waste is the first and most important link or ring in the discussion of recycling urban waste, which requires the participation of people in the waste separation of origin projects or plans.

Therefore, according to the above-mentioned cases, the researcher in this research seeks to have a review study on "Impact of Process of Urban Solid Waste Separation Plan from Its Origin on Urban Waste Management in Metropolises of Developing Countries".<sup>12</sup>

## Review of Theoretical Foundations

### Waste Definition

According to the organization for Economic Co-operation and Development (OECD) Waste refers to solids materials, liquids, gases (other than sewage) that are directly or indirectly generated by human activity and consider surplus from the point of view of producer and are discarded unintentionally or unusably. Waste is the inevitable material

from human activities, which is not required currently or in the near future, and is necessary to process or disposal it. The United Nations Environment Programme (UNEP) defines the waste as "things that their owner does not want them, don't need them, don't use them, and require processing and disposal.

Waste is the side product of human activities. Physically, wastes contain the same material that is in useful products and the only difference is in valueless of waste. In many cases, this worthless is due to of being a mixture or being unknown of these materials in waste. Separation of waste material can be one way of increasing the value of materials and finding applications for them. Generally, there is an inverse relation between the extent of waste mixing and its value.<sup>4</sup>

Wastes can be categorized from a few views in terms of physical condition (solid, liquid, gas), in terms of the main application (packaging, food, etc.), in terms of material (glass, paper, etc.), in terms of physical attributes (combustible or burnable, compostable, recyclable), in terms of origin (household, business, agriculture, industry, etc.) or the safety amount (dangerous, safe). Household and commercial waste, which is totally called municipal solid waste (MSW), usually includes for less than 10% of the total waste flow and 90% of the rest are agricultural, industrial, Mining, production, generation, water treatment, construction and destruction waste.

Household waste has always been a complex problem in metropolises management. Due to the wide range of materials in this waste (glass, metal, paper, plastic, organic material, etc.) and complete mixing of these materials, several problems arise in their management. Also the combination of waste in different seasons, changes in different geographical regions and from one country to another, so these factors prevent a unit solution to solve the problems of waste management of these cities. Commercial and industrial waste is produced usually more uniform at higher levels; hence a management system capable of managing household waste is certainly has enough ability of managing waste from other sources.

The garbage can is good sources for clean and reliable fuel, in this way. They also reduce the consumption of primary energy. These new technologies are considered the top priority of EU country member in dealing with waste and garbage.

### Waste Separation from Origin Definition

The process of separating garbage and solid waste by producers at the source, especially in homes, and recalling it in special containers that are installed for this purpose in urban environments (residential, commercial, educational, etc.) are called waste separation from origin.<sup>7</sup>

## Urban Management

If the city is considered as an organization, it is necessary to have an element at the top of it for future planning and the management of current affairs, which is called urban management. There are many problems in cities in order to solve it, urban management is considered necessary, issues such as; the city's future expansion situation, providing public utilities (water, electricity, cleaning and sanitation) to build a centre with various functions, construction of passages and alleys, etc., in some countries where have achieved the urban unit management, decisions related to the city either taken and implemented directly under the council and municipality or in a way, it is executed with the observation and approval of these two urban institutions, but in developing countries where urban management is not uniform, there are decision makers and though city council executives have not direct supervision on it but it is necessary be familiar with the field of duties and responsibilities.

## Waste Management

Waste management is one of the most important concerns of human societies. The daily increase in the volume of wastes from one hand and the diversity of them adds to the complexity of the conditions and way of their collection and dispose. Urban waste Management depends on factors such as waste production, collection, transportation, waste disposal and recycling, so the scope of management of this category is very broad and variable, but there is no way for such a subject but management and strategic plan.

The widespread progress of science and technology in various fields of chemistry, physics, medicine, etc. leads to an entrance of variety of hazardous wastes even in to household common wastes. Nowadays, traditional collection and disposal systems are not accountable and cannot prevent environmental pollution due to kinds of chemical, microbial, radioactive, radioactive, and waste. The main components of a modern waste management system are generally included production, collection, separation, processing and recycling, that in connection with each of these steps, a brief description is presented.<sup>13</sup>

## Solid Waste Management

The management of solid waste involves a systematic and coherent set of control, production storage, collection, and recycling disposal of solid waste materials, in accordance with the best principles of public health, economy, conservation of resources, aesthetics and other environmental requirements and what is of interest to the public.

With this definition, solid waste management consists of all administrative, financial, legal, design and works of

engineering, in all the wide range of solutions to issues and problems of solid waste that have been delegated to society authorities by general public.

The complex stages between subjects such as political science, local and urban planning, geography, economics, public health, sociology, statistics, communications and conservation of resources as well as engineering and materials science.

## Turn Waste into Energy

The heat activity of waste in form of term (waste to energy-WTE) is one of the most favoured activities in the world. Today, WTE systems have been affected by very rapid development in the past decades not only as a method to disposal of garbage and waste has use, but is used as a source of clean and reliable fuels, without the least impact on the environment.

## Waste Production

It consists of activities in which valueless materials either should be discarded, or collected for disposal. For example, chocolate shells do not have a value for owners after eating chocolate and often spill out of doors. Therefore, today with population growth, the amount of waste produced has also been increased and new methods and technologies should be used to manage it. In this section, the active elements in the waste generation are examined from different aspects. The quantity of solid waste materials:

The total of produced solid wastes is called as its quantity. Many variables including the level of people's literacy, geographical location, sessions of year, environmental and health awareness affect this amount. Obligatory and effective elements in the solid urban waste management system.

## Production

The foundation of planning and designing a solid urban waste management system is recognizing the quantity and quality of production. The basic quantity of production is effective in the volume of investment for machinery, storage containers on site, transmission stations, landfill capacity, organizing and proper organization, while the quality of materials depends on the type of processing, especially metropolis.<sup>7</sup>

The growing trend of waste production in metropolitan areas continues uninterrupted, and due to the current economic, cultural, health and environmental conditions, most of the waste produced is buried, and this means increasing the current costs in the solid waste management system, shortening the useful life of the urban waste landfill, increasing health and environmental pollution, wasting natural resources and Factors Affecting Garbage Production (waste).

1. The level of citizens' economy
2. The quality of consuming goods
3. The quality of the packaging of goods
4. Durability and longevity of consuming products
5. Cultural and social customs, traditions
6. Existence and non-existence of urban waste laws and regulations
7. Lack of proper tariffs with different produced wastes.

### Storage, Processing and Administration on Site

The speed of this element depends entirely on the activity of public relations and the awareness of part of the solid urban waste management system. Storage of solid waste produced in production resources is one of the important activities in the field of solid waste management. The frequency of waste collection by machinery, and especially collection, is mainly directly related to the capacity of solid waste storage tanks, which this importance itself greatly depending on the following factors is greatly varies.

- Type and nature of waste<sup>1</sup>
- Quantitative and qualitative characteristics of waste
- Climatic conditions governing the collection range

The choice of the type of reservoirs used to store solid waste in production sources depends largely on the available technology and the appropriateness of social and economic use, and the efficiency of the collection system depends directly on the type and specifications of the reservoirs selected. In general, the following points should be considered in the design of special reservoirs for solid waste storage.

- The tank must have a durable and simple structure
- The tank must be made of smooth surfaces without angles and curves
- The tank must be free of bulges and grooves inside it in order to prevent the presence of solid waste
- The tank must be resistant to corrosion and heat
- The tank must have a beautiful design and a reasonable price

In terms of health and aesthetic considerations, lack of proper storage of waste while creating unpleasant and undesirable landscapes, due to the presence of moisture, heat and food items can provide suitable conditions for the growth, reproduction of insects and rodents and carriers. It can be a factor in the prevalence of a variety of diseases. Therefore, the use of sanitary waste storage tanks can reduce the spread of pollution in the environment.

### Collection

The term collection includes not only the collection or remove of solid waste from various sources, but also the transportation of these materials to places where the contents of the collection vehicles must be discharged. In

fact, the costliest and difficult part of urban solid waste management is the issue of garbage collection. Historically, the history of garbage collection and disposal is related to the transformation of people's life systems from tent to permanent residence.

Newer administrations began in the 13th century in Hamburg, Germany.

### Recycling and Processing

Recycling is the process by which materials are collected and separated and used as raw materials to produce new products.

Recycling always has four stages:

- Collection of recyclable materials such as glass, metal, paper, plastic and foodstuffs
- Separation of these materials in different containers
- Processes that make these materials reusable (such as pulping paper or nylon and turning it back into paper and nylon)

Separation or segregation method at the destination is another method of waste recycling and separation. In this method, recyclable waste after entering the garbage centres or disposal by traditional method and by human resources or by various mechanisms systems such as screens, magnets, wind tunnels, etc. are separated and segregated from the material.

In general, all the materials that consumers throw away can be recycled. In practice, there is a difference between the quantity and quality of these materials.

The materials that is unsuitable for retrieval and return as basic materials are materials that their constituent elements are very different and of poor quality. Therefore, solid waste management with clear objectives about the same amount of waste that needs to be recovered or in other method of disposed and delivered, will be able to provide a specific system of use and reuse of these materials according to the amount of garbage's constituent materials, their recycling rates also vary in each country in terms of policy and economic status and resource needs.

### Solid Waste Disposal

Common methods used so far to dispose of waste include incineration, sanitary landfilling, or composting using traditional, semi-industrial, and advanced aerobic and non-aerobic systems. Due to the geographical location and climate of the developing countries' metropolises and the existence of abundant fertile lands around the cities, as well as the special features of municipal waste in these countries that A large percentage of it is organic materials, methods of incineration, compost and sanitary landfill , In such a way that be associated initially with the

implementation of recovery systems from the source or origin of production is of particular importance that are discussed briefly as follows:<sup>10</sup>

### Incineration

In general, any process that can reduce solid waste volume or weight by burning and converting it into low-harmful materials is called incineration. Many wastes can be burned, and the product of combustion is harmless gases that are easily sent into the atmosphere from the flue. Usually, in such cases, incineration is a safe way to dispose of waste.

In some of developing countries, Investment is not recommended for the construction of garbage incinerators due to the quality of urban waste in which recycling efficiency and fertilization are high, as well as due to the abundant fertile land around cities suitable for landfills.

But for metropolitan with huge volumes of solid waste, as well as biological and infectious contamination of hospital waste, which is usually more than other types of waste, experts recommend that the best way to dispose waste of medical centres is to burn it in incinerators. In most countries and cities of the world, it was common to burn waste in the open air until the 1970s, but in recent years, urban waste incinerators have been used to burn municipal solid waste, which is a chemical method to reduce amount waste.

Of course, in recent years, there has been a lot of progress regarding waste incineration and air pollution standards have been observed in it. So in this regard the following factors should be considered in the design and operation of waste incinerators:

- Waste incinerator must always have complete combustion
- It should have a suitable chimney and be cleaned in time
- It should not cause any pollution in the environment, whether from the atmosphere or other environs
- It should not have high maintenance costs
- It should not have high fuel costs and be balanced limit
- Its capacity should be sufficient and appropriate
- It should have high efficiency and make necessary use of it against spent expenses.

Combustion of urban solid waste and other garbage' with incinerators such as other disposal methods has an advantages and disadvantages, which are briefly described below:

### Advantages

- One of the best benefits of this method of sanitizing of operations, rapid elimination of waste and the prevention of the spread of pollution and garbage's

stench on site

- In this method, less land is needed and considered an economic method in large and densely populated cities where land and its scarcity are issues of urban management
- The rest of the ash is not biologically hazardous and can be buried because it is free of organic matter and bacteria<sup>13</sup>
- Climate and atmosphere change have almost no significant effect in this method
- Incineration of garbage in incinerators has a side benefit such as the use of heat generated to warm the boilers and thus energy
- Modern types of such devices completely convert fuels into ash and with less volume, it's affordable to transport
- Residual combustion materials are used to fill hollow and unsuitable soils

### Disadvantages

- This method requires more investment and initial costs compared to other methods
- This method causes odour, smoke and air pollution, which is generally objected to by the people
- In general, burning is not a complete procedure and the resulting ash needs to be repelled
- The cost of maintenance and repair is more than other waste disposal methods
- Experienced personnel and experienced people are needed to operate and maintain incinerators
- This method is not a suitable method for disposing of hazardous wastes such as radioactive materials and explosives

### Reproductive Hygienic Burial and its Methods

Waste sanitary landfill is the transfer of solid waste to a special landfill in the heart of the soil so that there is no danger to the environment, or condensing and covering it with soil or other sanitary materials in a completely systematic So that the waste is completely enclosed inside the capsule and there is no possibility of leachate and gas penetrating around the cell. The leachate and gas collection system and the leachate treatment are predicted, in the burial sites through this method. This method is the most common method of landfilling in the world.<sup>6</sup>

Waste sanitation operations include the following four steps:

- Disposal of waste in a controlled situation
- Distribution and compaction of waste in a thin layer for the volume of materials (about 2 meters thick)
- Cover the material with a layer of soil about 20 cm thick
- Covering the final layer of waste with a thickness of about 60 cm with soil

## Different Methods of Sanitary Landfill

The different methods of sanitary landfilling vary greatly depending on the geographical location, groundwater level, and the amount of soil available to cover the waste, which is briefly mentioned below:

**Area Method:** These methods are used when the ground is not suitable for excavation. In this method, waste is compressed after discharge by heavy machinery in thin and long strips on the ground and covered with soil daily.

**Ramp Method:** Most often, when a small amount of soil is available to cover the landfill, a ramp method is used. Basically, the most favourable area for sanitary landfill operations in this method is low-slope mountainous areas. This type of burial is also called the method of filling the natural low and high altitude of the earth. In this operation, replacement and compression of materials is done according to the previous method and the necessary soil to cover the waste is provided from other parts of the place.

**Trench Method:** This method is used in areas where soil with sufficient depth is available and the groundwater level is low enough. In this way, trenches with a length of 12-30 meters and a depth of 1-4m and a width of 4.5-15 meters are dug. Then, the waste will be emptied into pre-prepared trenches and compacted into thin layers, usually between 150-150 cm.

## Compost as a Method of Disposal

Bio compost production is one of the most economical and economical ways to burn urban waste compared to other garbage's disposal methods. So that in the vicinity of metropolises, it is possible to obtain a suitable fertilizer with a small investment to develop the green space of the city or even to sell and generate income.<sup>12</sup>

It should be noted that due to the relatively large capacity of composting facilities and also the limited production volume and the need to comply with the time of conversion of organic waste to compost, not all municipal waste convert into compost, but since a large percentage of our urban waste consist of organic materials. Bio compost production can be well placed at the forefront of urban solid waste recycling and sanitation programs.

Compost is the controlled decomposition of organic materials at appropriate temperatures and humidity by bacteria, fungi, moulds, and other aerobic or anaerobic microorganisms. Compost also has high levels of humus, which modifies the soil and can have role in continuously to improve the living conditions and performance of soil organisms gradually and continuously.

## Waste Management Importance

In terms of historical, the most important requirements

for waste have been health and safety. In such a way that waste should be managed somehow to have at least risk for human health, but today's societies have introduced broader requirements, environmental stability (the cycle of the material return to nature) through recycling and reuse and economic efficiency is one of the its most important, in the framework of this necessities, the most important reasons for the significance of waste management can be described as follows:<sup>5</sup>

- Conservation of natural resources: (since the 1970 s) due to concerns over the high rates of limited material resources consumption and energy of the earth.
- Prevention of environmental pollution: Pollution even in a small amount of it, causes change in the environmental situation (atmosphere, water and soil, etc.), and is certainly affected by the entrance of waste into the nature cycle (e.g., leachate from the landfill to aquifers and other cases)of the environment, especially urban spaces gets serious damage; Therefore, there is urgent need for a comprehensive strategy to manage waste to reduce the pressure, on the environment, at an affordable cost.

The necessity of adopting the comprehensive and integrated approach waste generated reduction or waste management in a sustainable, eco - friendly to economic and environment with respect to the system of nature and urban environments also is the necessity of attention to waste management.

## Urban Solid Waste Classification

**Industrial wastes:** Industrial wastes, is useless material from industrial activities and usually include metals, plastics, chemicals materials, and finally special and hazardous garbage, their collection, transportation and burial are subject to special rules and regulations.<sup>2</sup>

**Hazardous waste:** Hazardous waste is a solid or liquid waste that, due to its quantity, concentration, and physical, chemical, or biological quality, can causes mortality increase or serious disease.

**Hospital waste:** Hospital waste is any waste that is produced during the diagnosis, treatment or recovery of humans and animals, or in research activities in these fields, or in the production or testing of biomaterials.

**Sanitary and environmental effects of waste:** Lack of control of urban and rural waste, including human, animal and plant waste in the environment, due to the existence of different types of food waste with proper humidity and heat and shelters that are always in the waste masses, are the main causes of many human and animal diseases.

## The Necessity and Importance of Research

Human life in the current situation, that is along with the

widespread development of the machine and its effects on the urban environment, which is the place of establishment of contemporary man, has problems and complications due to increasing industrial development and its difficulties in environmental health.

This development, which has led to the mass production of goods, supplies and the consequently widespread production of waste at the level of large cities and metropolitan areas, has made urban management a major challenge in urban waste management.<sup>3</sup>

Today, it is inevitable without providing solutions and interaction and participation of citizens with urban management to solve the health and environmental problems caused by the collection of municipal waste, which is a large volume per day, the only appropriate and practical solution for realizing urban waste recycling is to implement segregation of origin, which has shown its efficiency compared to other waste management projects and schemes.

At present, the share of sanitary waste disposal and its fundamental control in developing countries is very small, which if planned and implemented by health and engineering disposal, imposes heavy costs on urban management, so by implementing a plan to separate urban solid waste from origin, recycling and using natural processes such as fertilizer (compost) in convert waste and make people feel involved in household waste segregation can be very effective in saving and reducing the cost of solid waste management.

Due to the importance of separating waste from the source or origin, it is impossible to address this issue from the environmental, health and economic aspects without the participation of citizens, because the main producers of waste are the same citizens whom, if they give the necessary information on waste issues, reuse possibility of them, as well as the detrimental effects of its unsanitary disposal on the natural and human environment, can play the most effective role in this regard by providing the necessary facilities, and on the other hand, to achieve the correct system of segregation from the origin will be possible with people's participation and awareness of their role, so it is necessary to consider the role of awareness, education and culture making for citizens with the cooperation of urban management in order to successfully implement the plan to separate urban solid waste from the source.

### **The Role of Culture and Education in the Development of Urban Waste Segregation Systems**

Culture is expressing and affirming identities and differences and is therefore a dynamic factor for the realization of social and participatory activities. The characteristics of developing countries the richness of natural resources and energy on

the one hand and the incomplete or even inappropriate exploitation of them on the other hand has led urban management to attend to people's relationships with the environment around them, i.e. water, air, plants, natural resources and so on that are considered as environmental heritage to be concerned with a set of methods and living conditions and services.<sup>6</sup>

Therefore, certain parameters such as cultural waste patterns are able to provide a solution to environmental issues and problems, and on the other hand, it is necessary to use practical and flexible models that are used in both urban service management (traditional and modern), In order to explain the desired goals in the direction of solid waste management with codified, coherent and continuous programs.

Therefore, the unprincipled disposal of waste by citizens can harm the urban environment and have a direct impact on human life, so solving the health and environmental problems related to waste in large metropolises will not be possible without infrastructure and cultural development to separate waste at the source. Given that the implementation of educational programs in the form of compulsory training courses is not possible for.

Therefore, the best action in this regard is to provide public education through mass media such as radio and television. The survey, which was conducted as part of the study also specifies that the general public are significantly affected by radio and television programs, and information related to waste and recycling could be used in ways other than aforesaid programs i.e. using billboards. Installing placards in the area and distributing posters and pamphlets to educate the public.

### **Helping the Macro-economics of Society**

Economic benefits arising from the waste separation in origin in the vision of sustainable development environment is important natural capital is essential for both direct consumption (e.g., clean air respiration) and maintenance of production process.

Therefore, damaging the environment means a continuous reduction of a country's capital and reduces the quality of its services, and as a result harms welfare of the city.

Economists are actually looking to determine the extent in a way that does not harm the survival of this natural capital.<sup>8</sup>

By creating a culture of segregating waste from origin among citizens, it is possible to prevent the waste of valuable economic resources and to re-introduce it to the cycle of economy and production.

And can be said explicitly that waste can play an important role in obtaining revenue in a country's economy. If waste is separated from its original source, the cost of recycling

will be reduced and the percentage of waste recycling will increase.

Accordingly, dry and wet waste separation plan from the source, is proposed and urban managers should create a culture among citizens to achieve maximum waste efficiency and provide facilities and equipment for its realization.

The waste segregation and recycling plan in addition being able to save the city from environmental pollution, will also be effective in boosting the urban economy.

Since it is said that the full implementation of the waste segregation plan from the source leads to huge amounts of revenue. Because it reduces waste collection costs and is also effective in creating jobs and sustainable development.

An important factor that completes this huge cycle is the participation of citizens in the separation of waste from the origin.

Municipalities must implement cross-cutting and long-term programs to attract the participation of people and organizations in this field and support private investment to carry out the waste collection, segregation and burial process.

According to experts, almost all waste can be recycled, so everyone must work together to prevent the waste of national capital and, with the proper separation of waste return this dirty gold to the cycle of economy and production.

### **Strategy in Solid Waste Management Consideration Necessity**

Today, solid waste management is an interdisciplinary activity based on engineering principles. It also covers economic, urban, local planning, and social sciences. Traditional engineering methods, which ignored public attitudes and perceptions, are no longer acceptable. Technological advances have led to changes in priorities, while public health and the economy likewise are of particular importance.<sup>7</sup>

The solid waste management hierarchy creates a clear vision for solid waste management design, and the hierarchy of strategy management and different options are highlighted in order of importance. The goal is to create the best possible practice for solid waste management so that minimize waste. The following are affective element of hierarchy<sup>10</sup>:

#### **Avoid Waste Production**

Avoidance of waste production has the best and highest strategic preference or selective option and therefore ranks first in solid waste management. This method is the least expensive, because the lack of waste means not spending

money on waste management. The most suitable place to avoid waste generating is waste production resources. Waste production sources include producers and traders. Manufacturers must use zero waste production methods. This includes changing or modifying in the process, adopting new technologies, or replacing raw materials with materials that can prevent waste production.

Customers also can change their shopping habits in such a way that as much as possible they make their purchase in general, buy the Buy products with a proper life with minimal packaging with the least packaging, avoid buying products in disposable containers, do not buy low-durable goods. Do not buy bulky and substandard packages and use hand tools several times. It is easy to see that by observing the above points, a very significant effect can be created on the amount of waste production.

#### **Waste Production Reduction**

The most important option after avoiding waste production is to reduce waste production. This includes redesigning, packaging with less raw materials, eliminating unnecessary packaging, execution of new processes and replacement of products with reusability instead of disposable products and using durable products, as well as considering the product life cycle in its Initial design in such a way that it is possible to reuse and recycle it.

On the other hand, consumers also can significantly reduce the cost of living by observing the right principles and buying as much as possible, in addition to reducing the amount of waste produced.

#### **Reuse**

Reuse is the use of more than one time from products in its primary form, which prevents the consumption of resources, raw materials, energy, as well as the production of waste. Simple examples include the use of refill beverages, transport pallets, and use of clothing, utensils and furniture is unused by those who can use it.

Reuse includes the use of products for different purposes than primary production, such as the use of plastic containers as seedlings, the preservation of young plants, artistic activities, food and chemical storage, and the use of paper on both sides of notes for writing and drawing..., and this list is unlimited.

#### **Recycling**

When you can't re-use a product for a long time, it's best to include it in the production cycle as a second-hand raw material to produce new products. Usually, producing new products from recycled materials requires less energy and preserves the environment, it also reduces the use of new resources and raw materials.

### Recovery (Extraction)

Energy recovery can be fully used as a viable environmental option after reduction. This option is considered as the last step of exploiting the maximum benefits of waste materials, this includes waste incinerators and other methods of extracting the heat energy hidden in the materials.

### Purification and Burial

This step is the last and least preferred option in the solid waste management hierarchy, in any case, even if we follow the rules of solid waste management hierarchy, we will usually have some waste. The remaining waste must be treated and buried with observing safety, environmental, health and insect and rodent problems, as well as social problems.

### The Role of Waste Reduction in the Source and Its Effects on Solid Urban Waste Management

Reduction from origin is the design, manufacture and use of products in a way that reduces the quantity as well as toxicity of production after the useful life of the product. Decrease in origin is not a tool for urban waste management, but it can have a positive effect on waste management systems.<sup>3</sup>

In reducing from origin, by specifying the destination and the final consumption of the product during the design and packaging of products with minimal toxic substances or at least other materials with a longer useful life, can reduce urban solid waste from the origin of production. The reduction in the origin of urban solid waste can be done in companies and households with proper purchase and reuse of products and materials.

### Ways to Reduce Waste at the Source of Production

There are several ways to reduce waste at the source of production, the most important of which are:

#### Reuse of Goods

Failure to use disposable goods and use of recyclable goods significantly prevents the production of waste products. For example, use permanent, reusable bags (made of fabric or durable plastic or leather) instead of disposable nylon bags when purchasing, buying milk in glass and in durable containers instead of disposable or using multi-Consumption is a small example of this method.<sup>3</sup>

#### Increasing the Durability of Manufactured Goods

Durable products have a longer shelf life. Obviously, such products enter the city's waste stream later as waste materials. Therefore, it is necessary for industries and factories, while using newer technologies, to use materials whose products have a longer life and can be recycled, as well as to be able to repair, renovate or repair them. In this

case, citizens can play an important role in reducing the production of urban waste by encouraging the purchase of durable goods.

For example, if each consumer uses an average of 16 durable rubber tires instead of 32 car tires on average during its lifetime, the volume of discarded tires will be greatly reduced.<sup>6</sup>

### Consumption of Materials According to the Packaging of Goods

Citizens need to learn and be educated to solve the problems related to waste disposal. One of the fields of education can be waste management, especially the waste caused by the packaging of goods and the problems that occur in the landfill, for example, people who have to use raw materials which have recyclable containers or use in goods that their packaging materials can be decomposed in the soil. Consumption of paper-bound goods is much better than that of nylon-bound goods. Because some nylons stay in the ground for up to 20 years without change.<sup>9</sup>

### Reduce the Amount of Toxicity in the Composition

To prevent toxic substances from entering the environment and to avoid the resulting damage, it is possible to reduce the toxicity of substances that enter the environment in the form of waste products as much as possible by changing the production process and using appropriate methods. By separating hazardous waste and using special methods to treat it, the risk of leachate toxicity at the site or exhaust gases from incinerators is reduced. Mixing hazardous household waste such as cleaners, waxes, insecticides, dyes, thinners, air fresheners, and cosmetic sprays with regular waste can produce toxic leachate in the landfill and pollute the water and soil. Therefore, with special programs for separate collection of hazardous household waste and allocating a special place for burying these materials and also considering the health and engineering rules in the burial site, their toxicity can be prevented from entering the environment.<sup>10</sup>

### Conclusion

Separation and segregation of waste at source is much more efficient and effective than separation at other stages of solid material management due to its ease, need for less time and cost, less contamination, and less damage of recyclable materials. The remarkable value of the separation of dry waste at the source and dry waste from the total production waste to the production of waste energy, in terms of environmental, health and economic on the one hand and the need for proper and hygienic burial and compatibility with other countries, on the other hand. Provides appropriate strategy and appropriate executive plans for metropolitan areas of developing countries.

Solid waste segregation plan, which is one of the most fundamental and effective methods of solid waste management in metropolitan cities, which has experienced and observed the positive effects of this specificity in other developed countries.

Undoubtedly, in the metropolises of developing countries, where a large amount of waste is produced annually and its growth is significant, and on the other hand, the share of dry waste is increasing as stated in the statistics, the undeniable value of the separation plan from the source of by urban solid waste production is increasingly considered, and on the other hand, metropolitan areas are facing problems with land scarcity for landfilling due to overproduction while not paying attention to the separation from the source to reduce the volume of waste.

In order for this project to be more successful, in addition to issues such as education and culture creation of citizenship and the use of professional manpower and equipment, coordination and other follow-ups, is necessary that private sector participation and participation is the main link in this management chain. The driving force behind the Coordination and other follow-ups are needed, that use and participation of the private sector is one of the main links in this management chain and can be the driving force behind the successful implementation of this project that naturally, its effects and results will be seen by both the city municipality and the citizens.

With implementing plan of separate waste at the source can achieve the development and advancement of urban management goals. These goals include: reducing water and soil pollution by waste leachate, reducing air pollution by producing toxic and hazardous gases due to waste, reducing transportation costs, disposal, and burying waste and returning costs to municipalities to implement development and urban projects, recycling of separated materials such as metal cans, plastic, glass and paper. It also paves the way for investment in waste recycling through which, waste management costs can be minimized and environmental hazards can be prevented separated materials such as metal cans, plastic, glass, paper. The lack of separation of wet and dry waste from the source creates many problems for recycling and reusing this dirty gold. And if the culture of segregation be not institutionalized in families, a lot of money is spent on waste segregation in the factory. Separating waste from the source will significantly reduce waste management costs.

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