Innovations

The Policy of Iraq on the import of waste between recycling and dumping/ A survey study

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***Abstract*:**
Waste is a global problem and not a domestic problem confined to one State alone. As technological development increases in all aspects of life, the waste generated increases. The survey found that most of the imported and domestic products studied in the research are recyclable, consisting of refillable glass bottles, aluminium, plastics and cartons, all of which represent national wealth and resources with which to operate stop plants in Iraq, as well as a shortage of recycling plants in Iraq compared to the daily waste produced. In addition, there is a shortage of recycling plants in Iraq compared to the daily wastes in question. The waste recycling plants consisted of one plant in Sulaymaniyah governorate, the other in Al- Mahmudiyah district and the third in DheQar governorate, which has been out of service owing to its combustion, and the fourth and fifth in Karkh and Rasafa districts, both of which have been under construction since 2017. Most of the waste studied in the research is recoverable (aluminium, plastic, glass, cartoon) and all of it is imported by the state and its final plant is unhealthy.
***Keywords**: 1.Glass bottles, 2.aluminum cans, 3.plastic packaging, 4.cartons.*

Introduction:
There are several definitions of solid waste:
1- WHO definition: The term waste is garbage, garbage or waste, which are some of the things that the owner has become unwilling to want somewhere and at some point in time and are of no significance or value.
2- Environmental definition: From an environmental point of view that a waste poses a risk from the time that a relationship occurs between it and the environment, this relationship can be direct or the result of treatment.
3- Economic definition: From an economic point of view, every substance or object of economic value is considered to be non-existent or negative to its owner.
4- Legal definition: Waste is all that is left by the process of production, conversion or use, namely, every substance, product or, more generally, everything transferred that is neglected or abandoned by its owner. Through all the above definitions, it can be said that all definitions converge in the same sense that solid waste is worthless at all levels, both social and economic(1).

Types of Waste

Waste is generated continuously in every single way from our daily activities. Each activity will generate different types of waste which will requires its own separate or specialize treatment, The types of waste that is commonly generates in Malaysia are as follows;

a) Municipal Solid Waste:
Domestic Waste ;
Commercial Waste ;
Community Waste ;
Construction Waste ;
Institutional Waste
b) Hazardous Waste
c) Industrial Waste (2).

Solid waste types:

Solid waste includes a wide range of wastes, the quantities and types of which vary from country to country and from city to city within a country, depending on the population density, economic situation, living level, culture and social level of the population. It barring varies according to the year, geographical location, physical planning and demography of the city. Solid waste types can be divided according to their degree of gravity into hazardous solid waste and non-hazardous solidwaste.

Hazardous solid wastes:

Wastes of various activities and processes or their ashes that retain properties of the hazardous substance that do not have original or alternative uses,are source of imminent danger to human health and the environment for toxic, explosive or inflammable substances contained, and their sources include industrial and agricultural sources, hospitals, health and pharmaceutical facilities, and are sometimes produced from wastes of indoor population activities and can contain sewage sludge. And also E-waste that includes discarded computers, office electronic devices, electronic entertainment devices, mobile phones, televisions and thumbnails. The definition includes electronic devices that have been used and are normally usable, sold, recycled or disposed of (1).

Non-hazardous solid wastes:

are strong squanders that don't contain substances or parts that have the attributes of unsafe substances, shift in their compound and actual qualities and contain natural and inorganic substances, for instance:

1- Metropolitan strong waste (trash), which ordinarily incorporates squander from homes and organizations, for example, shops, business markets and administration foundations like schools, regulatory foundations, roads, parks, lodgings, emergency clinics and sewage treatment.

2- Destruction and development squander, which is the aftereffect of metropolitan improvement in many towns and towns and results in measures of soil and building waste left on open walkways and streets.

3- Farming waste is the buildup of waste from different horticultural exercises.

4- Modern waste: squander from different modern exercises like food, synthetic, mining and development materials ventures.

5-Squander comprising of paper and cardboard is the waste that not entirely set in stone by its arrangement of paper and cardboard and that can be created by any monetary action or by the city misuse of the venture.

6- Squander comprising of materials, which is the result of fiber, deer, refining, etc.

7- Plastic-based squanders are squanders that have been recognized by their creation as palsticks and can be produced through any monetary action, for example, endlessly bundling materials.
8- Glass-based squander is the waste that not entirely set in stone by its gem glass creation and can be produced through any monetary action, for example, windows and glass jars.
9- Metal waste: Squanders recognized by their metal creation can be produced by monetary action like jars, salvaged material, machines and building materials.
10- Inorganic squanders are squanders starting in plant or creature materials like sand, dust and other composite substances.
11- Natural squanders are squanders produced from plant or creature sources, for example, extras and nursery waste, water and wood by leaves or industry that can be decayed and treated within the sight of oxygen inebriation (or in its nonappearance) high-impact corruption (in the two cases it very well may be viewed as soil nutrients(1). Then, at that point, strong squanders comprise of various materials changing in size, weight, thickness, shading, shape, substance sythesis and warm satisfied, squander parts can be partitioned into normal areas, for example, glass, paper and containers, extras of food and other natural materials, bundling materials and plastics, iron, aluminum, destruction and development waste, wood and different materials ordinarily have a straightforward proportion (3).

Waste or garbage has become a source of global profit and trade:
The problem of waste or garbage has become a source of global profit and trade and a wide range of export and import, which confirms that it has become so profitable that large States such as China import and purchase waste from other countries for domestic manufacture and hence export as products, covering all types of waste that have increased dangerously with rapid industrial progress and lack of disposal; This has led to a serious increase in the accumulation of waste, which threatens public health, especially since a large part of this waste is disposed of unhealthy.In the end, we are seriously polluting the environment, all of which have a negative impact on humans, plants, animals and the environment in general; The incidence of diseases increases significantly from respiratory to liver diseases, kidney failure and other diseases depending on the type and degree of exposure to pollution, water pollution, acid rain and air pollution, which are reflected in the pollution of vegetation and animal-fed agriculture, resulting in global warming, serious climatic changes, deteriorating agricultural production and the loss of many agricultural lands.Some wastes are left not to be recycled as easily as plastic. Most of them are often buried healthily and some are recycled at a higher cost. Most States therefore refuse to import plastic waste. Strict laws have been introduced to prohibit the indiscriminate dumping of waste and to prevent the establishment of garbage dumps and the provision of specific places for the collection of each type of waste. It has proved to the world that recycling of waste is an inexhaustible gold mine, and the government provides in the yard of each house the following:
1- Yellow bags for lightweight waste collection such as bags, juice cups and plastic.
2- Green bags, including paper, newspapers and cardboard packagings.
3- Brown bags with all the leftovers, leftovers and leaves of the plant.
4- Black bags, including diapers, unclean clothing, metal tools and cigarettes.
And then we turn to the Chinese experience, where it relies heavily on strict laws and high fines. First, it sets specific hours for public funds to be placed before everyone by dividing them into four types of waste. Any person who fails to comply shall be liable to a fine of approximately 30$, There are heavier fines for leaving any waste on the street, even if a can of cigarettes. Because of the low price of labor in China, they have made huge financial gains, started importing waste for huge gains, then had to stop importing because most of the waste was hard-to-recycle plastic, and there are about 600 factories.There is also a pioneering experience in this area that adds an important principle, namely that it is the cause of pollution that pays or does the price of

recycling, in the sense that recycling is the responsibility of the product, for example, the food beverage company is responsible for the failure to forage or pay the price of recycling to the state, as well as all other companies for any product, where each company pays a certain amount of money in advance based on the quantity of its product, which the law has been in force since 1999.Finally, in Egypt, it is estimated that the volume of waste amounts to about 22 million tons per year, and that Egypt has managed to recycle about 15% of it, a start that must be supported by numerous international experiences in this area, especially the German experience, taking advantage of the sanctions regime in China, and charging the product for the cost of recycling like some countries(6).

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One of Iraq's most important environmental statistics indicators is the municipal services sector for the last three years, as shown in table (1)(7).

2018	2019	2020	Indicators
261	265	265	Total number of municipal institutions
88.8	88.7	89.9	Proportion of population served by urban waste collection(%)
63.5	63.7	64.6	Proportion of population with waste collection service in Iraq (%)
18.1	17.3	19.7	Amount of waste removed (million tons/year)
9.6	10.6	11.8	The normal amount of waste removed (million tons/year)
8.2	5.9	7.3	Amount of waste (demolition and construction residue) lifted (million tons/year)
1.3	1.4	1.5	Average amount of waste generated per person (kg/day)
926.7	3218.7	1,053	Quantity of hazardous waste removed (ton/year)
53.1	61.1	60	Percentage of normally waste that is removed (%)
64	67	74	Number of environmentally approved health landfill sites
149	157	146	Number of non-environmentally approved health landfill sites
93.8	87.5	87.5	The most standard waste disposal method in the provinces is dumping at non-environmentally approved sites(%)

Impact of waste on human health and the environment:

It has become known and scientifically confirmed that household waste contains pathogen, and the many different analyses and tests have been based on the vital efficacy of pathogens in waste, which have shown that the efficacy and activity of typhoid bacteria remains in waste for over 40 days, and that paratephoid and dysentery bacteria as well as anthrax remain effective for over 80 years.As burning takes place in a primitive way, large parts of the waste do not burn, which in turn is a suitable breeding ground for insects and rodents that may transmit certain diseases.

The dumping of wastes without proper methods of dumping from waste collection will lead to the discharge of such water from soil pores and the contamination of surface and groundwater sources.Similarly, if the resulting gases are not collected through a properly designed network, they may lead to significant risks, including leakage of gases, contamination of the environment, damage to public health, or explosion of these gases, leading to disaster in the perch and adjacent areas, thus emphasizing the need to use carefully considered scientific methods appropriate to the conditions and conditions of each area in the disposal of waste(4).

Waste burning risks:

No matter what the job of the experts in offering essential types of assistance to residents, it remains our essential obligation to shield ourselves and our kids from the wellbeing harm brought about by different natural ills. One of the most genuine is the peculiarity of waste

consuming in its different structures. Previously and before our change into a Western way of life portrayed by the utilization and utilization of numerous harmful fabricated materials, for example, plastic, nylon, elastic and different plants, the structure of our waste was normal natural, yet as of now, with the rising degree of illness in all parts of this advanced life, the copying of family squander, as well as of business and development squander, is turning into a significant danger to our lives. Here are a few realities about the consuming of waste:

1- The consuming of nylon, plastic and elastic radiates to the climate the most poisonous cancer-causing agents known to people today, called the "dioxin" bunch, which is endemic to fat cells in our bodies, camouflaging and influencing as though they were chemical and befuddling crafted by our normal chemicals. Newborn children, generally impacted by dioxin, which is found in the fat organs and in the blood of the nursing or pregnant mother and is communicated to the baby through the mother's milk.

2- Consuming waste is one of the fundamental driver of many sorts of disease.

3- Squander consuming deliveries many dangerous substances to the climate, including gas, poisonous minerals, for example, tin, chromium and other little particles that enter the body through the respiratory framework and prompt harm to the insusceptible framework, to the sensory system, to ripeness, to the liver and kidney(5).

Effected caused by plastic waste to human and the environment:

The studies and research on the damage caused by plastic residue give rise to great concern and controversy. The adverse effects on the environment and the human are as follows:

1- The ease to fly in the atmosphere makes them vain on the issue of hygiene, distortion of urban view and public taste, and causes the transmission of some infectious diseases.

2- Plastic waste causes the death of millions of marine and terrestrial organisms.

3- Impacts negatively on soil and agricultural crops as they form a buffer layer between the soil and the roots of agricultural plants.

4- They lead to a fertile environment for pathogenic parasites because of their ability to float above the water surface for a long time and lead to the death of animals when ingested.

5- If burned in their assembly areas, chlorine oxides, carbon and other gaseous compounds and many toxic acids and compounds are released to ozone-destroying ,detriment of human health and the environment.

6- The risks of plastic waste are concentrated in small pieces of plastic that infiltrate animal and plant marine life. These small wastes are mistaken for food by birds or turtles, concentrated in bird gear and starving.

7- These wastes cause many problems, such as deterioration of urban landscape, contamination of soil, depletion of soil, pollution and destruction of the aquatic animal and plant environment, spread of disease transmission factors due to water pollution.

Health Implications

Some scientists see some plastics as having carcinogenic effects, and a team of scientists discovered that the solid type of plastic is the type of polychlorphenyl(pvc) that was used in the food industry, and it is at 100 ° C, and it starts to degrade and contaminate the food commodities used in it. Then a scientific research showed that, as a result of exposure to vaporization of the chlorophenyl compound, experimental mice had contracted liver cancer, and that the use of thermodynamic plastics in hot food packaging caused the migration of certain components, especially from additives used in their manufacture, such as colors or antioxidant compounds, to food, causing health damage.Human exposure to various forms of urine-styrene results in some types of malignant tumors. This compound has cell mutagenesis and fetal poisoning effects. The implantation of multiple styrene compounds in trial mice led to tumors in them. Scientific reports

have been published on the efficacy of compounds that help to crystallize StarinYenitadu B plastics composition units in blood tumors(8).

Modern methods of disposal and utilization of plastic waste

There are two methods to disposal of plastic waste: recycling and energy production. The recycling method of waste plastics is considered to be one of the most important disposal methods, provided that the material is not contaminated or previously used for the packaging of toxins, hazardous chemicals or heavy metals. It is also advised that the products of the process of recycling should not be used for the packaging of foodstuffs and beverages, and that the process of gathering them in special stores after the process of downsizing and recycling is considered the most successful method of disposal. Researchers are seeking an appropriate alternative to traditional plastics made from oil and gas. Research has led to the innovation of organic plastics, bioplastics made from certain raw and renewable plant materials, such as maize, wheat, potatoes and sugar cane, where starch, sugars, cellulose and some treatments are obtained.This type of biodegradable plastic is manufactured within a relatively short period of time. Researchers are increasingly seeking to develop these materials as a means of providing fossil fuels and reducing emissions of toxic gases and harmful plastic waste (9).

Importance of waste recycling:

Plastic recycling has an important role to play in reducing source penetration and achieving sustainable development by securing raw materials from the exploitation of waste rather than raw materials. It also has an important role in environmental terms by protecting water and air from pollutants in their collection and reuse, rather than from burning that leads to air pollution or pollution that leads to groundwater pollution, without forgetting the role it plays in the economy by reducing the necessary space. In addition, it contributes to energy, since the energy needed to produce a product is much more than the energy needed to produce the same product from recycling waste. Industry found that if recycling programmers were taken seriously, they could help reduce the cost of raw materials and the cost of operation, and improve their image as permanent accused of polluting the environment(10).

Solid waste recycling and its environmental and economic importance:

Solid waste is a free-standing environmental problem because it pollutes the environment if it is not recycled and tapped instead of being thrown randomly, as is currently the case. Garbage throws at the sides and edges of the main and subways as well as on agricultural land, or is transported to a general garbage dump to be collected and then dumped without treatment. Developed countries use state-of-the-art techniques for waste use and recycling through:

1- Reused of household waste into high-quality organic fertilizer.

2- Utilization of solid residues by dry sorting.

Several methods of recovery and reuse of useful materials from solid waste are available, including: Magnetic sorting and aerosol sorting as well as waste insulation by component for recycling after pressing it, and Grease waste can be used in the manufacture of soap and candles and large-scale household furniture can be reused and transported by specialized companies. Recovery of materials from waste faces two major problems:

1- Preference for the use of raw materials over retrievers.

2- High cost of separation, assembly, transport and processing of recovered materials. Waste is sometimes reused without taking into account its health effects.

Sorting and separation of wastes is very important because the materials remain clean and non-mixed, which requires the cooperation of the population. Materials that can be separated from the source include: Paper, glass packaging, plastics, and rubber. Separation is usually done at a waste sorting plant where mixed waste is sorted before each excreted material is sent to the

production plants for glass, paper and aluminum or to the recycling plants for manure and plastics. Household waste is screened as hazardous waste, such as batteries and dyes, collected from the source or transported to hazardous household waste collection sites(11).

Practical Side:

The study models were collected from local markets (solid waste), all of which were non-recyclable, mainly from the point of view of the state and then imported or sold, but recyclable from the researcher's point of view.

And that's what the researcher demonstrated in the study, where the waste was sorted by type (glass, aluminium, plastic, carton box, paper).

1- Glass gans:

Glass bottles in Iraq go directly to land fill and all the class gans in the research are not refillable except for a few of them, which are refillable and applied to the Baghdad Soft Drinks Company as in the figure(1) and It's distributed between the importer and the local in the market.

Figure(1):Glass bottles are refillable in the Baghdad Soft Drinks Company

2- Aluminium cans:

The process of recycling aluminium is one of the processes that is highly energy-saving and raw materials and protects nature, It provides more than 95% of the energy used to extract raw material and extract aluminium from it. And it's because aluminium doesn't exist pure in nature, but rather as oxides. It also reduces the pollution of the environment by reducing drilling and reclamation and resulting dust and solid waste that can become an accumulated problem for the surrounding environment. Aluminium is easier to recycle than other metals, such as iron, due to the persistence of the aluminium element, its lack of oxidation and its ease of smelting and formation within the interstate during transport and storage of scrap. The majority of aluminium products are formed to be suitable for specific use and are inflexible for uses. For example, aluminium can sheets are mostly fixed and damaged once opened, but this does not prevent some domestic reuse cases. And finally the aluminium recycling industry today is a source of income for millions of households around the world, because it is widespread in the world. Because of the huge amount of aluminum cans that are discarded every day, there are only some companies that specialize in recycling aluminum cans, especially in millionaire cities, which can consume tens of millions of cans a day. The overall rise in metal prices in recent years appears to have led to a steady increase in the world's trend towards recycling. The main reason for recycling aluminum is no longer to protect the environment and rid the environment of waste, See figure (2)(12).

Figure (2): Aluminum cans for juices(locally)

3- Plastic cans:

Since the discovery of plastic, the early twentieth century has become an integral part of our daily lives; According to a study published in 2017 by the periodical Sainz Adventure, the production of virgin plastics up to 2017 was 8,300 million tons, resulting in an estimated 6,300 million tons of plastic waste, of which 9% was recycled and 12% burned, and 79% was disposed of in landfills or left in nature. And because plastic never completely decomposes in nature, it breaks down into smaller, finer parts, and so forth, it has become a curse that has struck the planet.

More than 12 million tons is the amount of plastic waste that reaches the seas and oceans annually, which is a major environmental problem with the inability to locate 99% of the waste. Plastic waste from packaging, bags and bottles represents only 1% of the total volume of waste in the oceans, while "micro-plastic particles," with sizes below 5 millimeters, represent the remainder ,See figure (3)(13).

Figure (3): Plastic cans for juices (locally)

4- Cardboard cans :

The importance of paper recycling can be cleared in two side:

1- Environmental side: It contributes to reducing and preventing the accumulation of paper rather than burning or burying it, thereby reducing the pollution of the environment, reducing

the emission of greenhouse gases that contribute significantly to global warming and climate change, and protects various agricultural lands by reducing the use of trees and wood, thereby increasing the capacity of trees to absorb carbon into the atmosphere, as well as strengthening the environmental sense of communities.

2- Economic side: Paper recycling is a purely economic process, providing a lot of labor, thereby reducing unemployment by providing young people with jobs in recycling plants, and also contributing to the rationalization of energy use and reducing the draining of imports of raw materials; fiber and wood in the paper industry, See figure (4)(14).

Figure (4): Cardboard cans for juices (locally)

Waste incineration

Waste incineration is a method of thermal treatment, and incinerators convert waste into heat, gas, vapor and ash. Waste is burned either by individuals or by a manufacturer or producer, and is used for the disposal of solid, liquid and gaseous wastes. This method is considered a practical means of disposal of hazardous wastes and biological materials such as medical wastes, waste burning is a controversial method due to the emission of gaseous pollutants, and the burning of substances such as dioxins has hazardous environmental consequences in the region immediately. This method is common in many countries such as Japan where uninhabited areas are very few and do not require as large areas as the landfill method(15).

Aluminum recycling:

its a process by which scrap aluminum is re-exploited to produce new products and involves simply re-smelting metals, which are now less expensive and energy-consuming rather than preparing new aluminum electrolysis AL3O2, which needs to be extracted bauxite ore and then refined using the Bayer process. That's why about 31 percent of the aluminum produced in each of the United States comes from recycled scrap(16).aluminum recycling is not new and has been a common practice since the beginning of the twentieth century and increased significantly in the Second World War. However, demand was limited until late 1960, when the popularity of packaged beverages spread in aluminum packs, thus demonstrating the importance of aluminum recycling in public opinion.Sources of aluminum recycling include: Aircraft, cars, bicycles, boats, computers, kitchen fixtures, gutters, wiring and many other products consisting of powerful, lightweight materials or materials with high thermal conductivity. Since recycling does not damage the structure of the metal, aluminum can be recycled indefinitely and used to produce new products that can be exploited(17).

Results and Discussion:

Solid waste is one of the important challenges to the environment. The inadequate waste management cause alteration the ecosystems including air, water, and soil pollution, thus it

represents a real threatening to human health. Some studies gave evidence that local population nearby municipal solid waste(MSW) facilities have low weight at birth, congenital anomalies, and few types of cancers. The increasing generation of solid wastes posed the burden on the high costs of municipal budget. Population increase, rapid urbanization, booming economy, and the rise in the standard of living have greatly accelerated the rate, amount and quality of the municipal solid waste generation. Biodegradation of MSW according to the time is an important factor that governs the amount of recyclable material particularly the organic contents. MSW generated from the developing countries are highly; heterogeneous in nature.The improper bin collection practices, collection, transfer and/or transport systems have great effect on the characteristics of the solid wastes. The plastics waste disposal is a major global environmental problem. As plastics are essentially hydrocarbons, they possess a calorific values ranged between 30 and 40 MJ/kg. Thus, they can be burned or incinerated in the municipal or other dedicated wastes with power and heat generation(18).The research found that all the materials in question were recyclable, as glass bottles were refillable or re-manufactured in one form or another, and aluminum packaging was recyclable, as well as plastics and cartons, where there was no use in burning or dumping them, as demonstrated by the researcher in(19). The sorting of the above items is either on-site at the beginning of their generation through dedicated containers or at the waste sorting plant after arrival through dedicated caps. There is only one recycle plant in Baghdad governorate located in the Al-Hamoudiyah district(20)and there is just one recycle plant in DheQar governorate and it burned as shown in figure (5)(21).

Figure (5): burned of DheQargovernorate recycle plant

Finally, it should be noted that in Iraq and most countries in the Middle East, waste is treated in a very primitive and outdated way. The method of dumping was very primitive and particularly harmful to the subsoil, groundwater and air pollution, but now the recycling of this solid waste is being used in the Sulaymaniyah Waste Recycling Plant, all but medical waste and access to fertilizer. Environmentally friendly, which is used as fuel in some plants rather than using environmentally harmful black fuels and human health, supplies water for all uses other than drinking, and creates the plant according to global standards. The project was built over with a daily recyclability of 1,100 tons and more in the future and 200 jobs. The environmental benefits of this project are that it used modern-day technology with only 15% post-treatment residue in this area and the first of its kind in Iraq in terms of operational capacity(22).

Recommendations:

1- Dissemination of awareness among the population through well-thought-out educational information programmes in which all stakeholders cooperate to highlight the problem of solid waste, as well as the importance of the personal screening mechanism of the wastes at their source, which is sorted into the first cysts of organic substances and the second for other substances in order to benefit from their components.

2- Encourage solid waste recycling industry projects and provide all necessary information and facilities to stimulate investors to take an interest in the trading industries.

3- The need to deepen the principles and concepts of environmental awareness of the population through environmental education as a course of study at all levels of education, with a view to developing the necessary skills towards the environment and respecting the relationship between them and their environment.
4- Expand the establishment of global-specification waste recycling plants capable of producing electricity from the burning of accumulated waste in all governorates of Iraq for waste disposal.
5- Import of modern techniques in the transport, circulation, recycling and processing of waste.
6- Assurance of environmental impact assessment when granting plant approvals and ongoing monitoring.
7- Accounting for randomly burn and burn waste and fines for imprisonment or financial fines.

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