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MANAGEMENT OF HOUSEHOLD WASTES IN THE CITY OF CONSTANTINE BETWEEN ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT

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ABSTRACT

Indeed, the main objective of this study was to identify the management and treatment of household wastes in the City of Constantine, so as to reach environmental protection and attain sustainable development, due to the high quantity of household wastes and the resulting negative phenomena as a result of irrational management, which led to damaging the urban environment and public health; the fact of resulted in the necessity to develop the sector through moving towards the use of sustainable management methods, which has been highlighted in this paper through addressing the sustainable management of household wastes and comparing the same with the management in the city of Constantine, together with analysing the results with applying some sustainable development indicators that measure good performance and effectiveness in this field, whereat it was concluded that the management in the city has shown to be a traditional management that relies on collection and sorting without recycling; and in the end discharging in landfills without any treatment. As a consequence, the efficiency of managing this type of wastes must be raised.

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Introduction.

In fact, household wastes represent one of the most prominent environmental problems that various countries of the world are suffered at the moment, as it is associated with the daily activities of a person who, with technological development, has become using new methods in his life in terms of eating, drinking, dressing, working and the like. Subsequent to which, this caused to the emergence of new household waste that nature is no longer able to absorb and analyse as before, which has then led to the difficulty of management and treatment thereof.

In this domain, Algeria has shown to be among the countries witnessing many problems, particularly in the field of management and treatment of household wastes, as a result of the continuous increase thereof due to the increase in the population and the improvement of their standard of living, in addition to the Algerian citizen's quest to follow a modern lifestyle that depends on the widespread consumption of laminated and packaged materials together with the single-use products, thus resulting in a significant increase in household wastes, which amounted to 14 million tons in 2021.

Notwithstanding the seriousness of household wastes, part thereof can be of great benefit, in particular with the emergence of the concept of sustainable development as an appropriate alternative in the management process, **as per stated by the United Nations Environment and Development Organization through its report submitted within the Agenda of the 21st century**, which is "reducing the same from the source, then proceeding to the recovery and recycle thereof through seeking to change the pattern of unsustainable consumption and production". (Ferouhat, 2016)

Beyond doubt, the City of Constantine is one of the most important Algerian cities distinguished in terms of natural and population in addition to its ancient historical status, as it is still considered the administrative, health and commercial centre of the province as a whole, and all such features have contributed to its expansion and growth, the fact of which affected the amount of household wastes and the management and treatment way thereof, which has witnessed lots of changes, both in terms of responsible entities or in terms of the management way itself. Subsequent to which, the following problem can be raised: **What are the methods of managing household wastes in the City of Constantine in light of environmental protection and attainment of sustainable development**?

In order to provide answer to this problem, we have asked a set of secondary questions:

- What is the meaning of household wastes? What is the concept of sustainably development?
- How to sustainably manage such household wastes?
- What are the methods adopted by the City of Constantine in managing and processing its household wastes? Which bodies are responsible thereof?
- Does the City of Constantine rely on the concept of sustainable development and environmental protection in the management of its household wastes?
- To which extent the indicators of sustainable development are applied in the management process?

In fact, in order to be able to analyse and address the research problem, we relied on the descriptive analytical approach in providing description and analysis for various concepts pertaining to the subject matter, through relying on available references and sources to build the theoretical aspect of this study. Furthermore, for the purpose of getting acquainted with the methods and ways of managing household wastes at the City of Constantine, field work and visits to various administrations and institutions were relied on in order to collect data and information for the purpose of analysing and answering the raised questions.

Firstly. **The management of household wastes within the scope of sustainable development.**

In fact of matter, household wastes stand for one of the most prominent environmental problems at this moment in time, as this phenomenon results from the increase of quantities thereof, whereat the environment has become unable to deal with through the inability of various living organisms to analyze them and use them as a source for their feeding and energy; thus leading to the emergence of a lot of economic and environmental studies that focused on the need to consider household wastes as raw materials for other industries, particularly if it is managed and processed in a proper and sustainable way. As consequence, to answer the raised problem, we first identify the concepts and points affecting the same from all sides.

I – Environment. A common term and multiple concepts.

In fact, environment is one of the commonly used terms; nonetheless, it is easier said than done to provide a specific concept thereto, as being a term used in many different sciences and fields, which concept changes depending on the subject being used therein and the purpose thereof. In addition, researchers and specialists have differed among themselves in providing a specific concept that everyone agrees on. Thereof, the concepts are numerous, the most important of which are:

1) The concept of environment as a term.

It stands for "the medium or spatial sphere in which a person lives, influences and be influenced, through the entire elements and data included in this field, whether they are natural, such as rocks, minerals, energy sources, soil and water resources, climatic elements such as heat, pressure, wind, rain, natural plants, marine and terrestrial animals, or human data contributed by man to the existence of urbanization and transportation routes, communications and the like". (Abdul Maksud, 1998)

2) The concept of environment according to the Algerian law.

The environment represents "abiotic and vital natural resources such as air, atmosphere, water, land, subsoil, flora and fauna, inclusive of genetic heritage and forms of interaction between such resources, together with places, landscapes and natural monuments". (Official Gazette No.43, 2003)

Above and beyond, it can be said that the environment stands for the mutual relationship between the natural environment and the living organism that lives therein; nonetheless, this relationship has witnessed many problems as a result of the great scientific and technological development that man has known, together with the inability of the environment to absorb all such development, which has to the highest extent affected its system.

II – The concept of sustainable development.

The term of "sustainable development" takes different concepts, depending on the medium in which it is used, as some people believe that sustainable development stands for the protection of environment, whilst some others believe that it represents the management of natural resources. Besides, in the mediums related to economic institutions, there are some people who believe that sustainable development is management of quality, environment, integrity, business ethics and the management of relationship with interest groups ... etc. Consequently, sustainable development has many concepts and definitions, the most important of which are:

1) Definition of the World Commission on Environment and Development.

Through its report entitled as "Our Common Future in 1987", this Commission provided a definition for Sustainable Development as "development that allows meeting the needs and requirements of present generations without compromising the ability of future generations to meet their own needs". (Kaci, 2017)

2) The concept according to the Algerian law.

Certainly, sustainable development is a concept that means reconciling sustainable socio-economic development with environmental protection, i.e., incorporating the environmental dimension within the scope of a development that ensures meeting the needs of present generations and future generations. (Official Gazette, No.43, 2003)

Under such definitions, it can be said that **sustainable development seeks to improve the quality of human life, but not at the expense of the natural environment, considering that attention to the environment is the basis of economic and social development**.

Therefore, the relationship between the environment and sustainable development is one of influence and impact, as protecting the environment is an essential element of sustainable development. The goal of sustainable development is to achieve environmental sustainability that guarantees the right of future generations to natural resources. To achieve this environmental sustainability, elements of pollution must be mitigated, especially pollution with waste resulting from various activities, including household waste, which is constantly increasing and is considered among the most dangerous environmental problems at the present time. Present.

III – The concept of household wastes.

Indeed, wastes are of great importance in the field of research and studies; subsequent to which, there are many concepts, as there is no unified concept of waste, they may converge in some aspects, but differ in numerous of them "on the basis that what is considered wastes by some people may be consumable or usable by others" (Tomi, 2002, p.190); however, we focused in this research on what was defined by Algerian law.

1 - The concept of the word "**wastes**". Wastes represent the remnants of recoverable or non recoverable materials, left as a result of a production or consumption process.

2 - The legal concept of "**wastes**". Algerian law defines the concept of wastes according to Article 03 of the Law No.01/19 pertaining to Management, Control and Removal of Wastes as "all residues resulting from production, transformation or use processes and, more generally, every substance, product and every movable that the owner or holder disposes of or intended to dispose of, or requires disposal or removal, inclusive of: household wastes and the like, bulky wastes, special wastes, special hazardous wastes and non-life waste" (Official Gazette No.77, 2001, p.10).

3 - The environmental concept.

In reality, wastes are considered as a danger, starting from the time when a relationship occurs between them and the environment, which relationship can be direct or indirect as a result of treatment or due to the dominance of the random discharge method over many years. (Abdul Jawad, 1989). In the light of the facts set out above, it can be said that wastes represent all the useless residues that a person discharges as a result of his various daily activities, which would lead to harm the environment if not properly discharged.

4 - The concept and types of household wastes.

The presence of wastes is considered very natural because a person practices a lot of activities that result in many wastes, in particular household ones that result from the activities of family members, which are useless or no longer needed or used. Therefore, it is necessary to be disposed of.

A - The legal concept. Wastes are defined by the Algerian legislator in Article 02 of the Executive Decree No.84-378 issued on the 15th of December 1984, specifying the conditions of hygiene and collection of solid and urban wastes, as: "urban solid wastes are household wastes and similar in type and size". On the other hand, the Law No.01/19 pertaining to Wastes' Management, Control and Removal, in Article 05 thereof, **household wastes and the like** are: "Waste resulting from household activities and similar wastes resulting from industrial, commercial, artisanal and other activities, and which, by their nature and components, resemble household wastes" (Official Gazette of the Algerian Republic No.77, 2001).

The presence of waste is considered very natural because a person practices a lot of activities that result in many wastes, in particular household ones that result from the activities of family members, which are useless or no longer needed or used. Therefore, it is necessary to be disposed of.

B - Types of household wastes.

They include all ordinary wastes that, by their nature and type, bear a resemblance to household wastes, as stipulated by the Executive Decree No.06-104 issued on 28th February 2006, specifying the list of wastes, inclusive of special hazardous wastes (Table No. 01).

Table 1. Types of household wastes and the like, according to the Algerian law.

Category	Type	Description
Ordinary wastes	Household wastes	They represent all solid wastes produced by the population and placed in public landfills
	Water treatment slimes	They include sand slimes and filter slimes
	Waste of public and private institutions similar to household wastes	They represent wastes that can be disposed of with household waste
	Green wastes	They include wastes from public and private gardens
	Markets' wastes	They include organic wastes similar to household wastes
	Street and road cleaning wastes	They represent the swept and cleaned residues thereof

IV – Sustainable management of household wastes.

The hazards pertaining to health and nature resulting from the traditional management of solid wastes, particularly household wastes, have led to the emergence of many economic and environmental studies that shed light on the need to consider household wastes as raw materials for other industries. Besides, this can be made based on a set of strategies and policies that fall within the scope of the principles of sustainable development stipulated by Agenda of the 21st century, which came within the United Nations Environment and Development Report on the process of managing household wastes under the title of Ecological Waste Management.

1 - The concept of sustainable management of household wastes.

Indeed, wastes are of great importance in the field of research and studies; subsequent to which, there are many concepts, as there is no unified concept of waste, they may converge in some aspects, but differ in numerous of them "on the basis that what is considered wastes by some people may be consumable or usable by others" (Tomi, 2002, p.190); however, we focused in this research on what was defined by Algerian law.

A - Sustainable management of household wastes. It stands for "the process of disposal and utilization of wastes of all kinds with the least possible harm to human health and environment, with the provision of financial dependence thereof" (Mohammed, 1998).

The United Nations Environment and Development Organization, in its report submitted within the agenda of the 21st century, the sustainable management of solid wastes stands for "reducing them from the source, then recovering and recycling them by seeking to change the pattern of unsustainable consumption and production" (Frohat, 2016), all the way through:

- Reduce the largest possible volume of wastes.
- Increase the percentage of ecological and rational recycling of wastes.
- Promote the ecological and rational wastes' treatment activities.
- Integrate the materials extracted from wastes in various activities.

The agenda program has illustrated a set of options defining the integrated and sustainable management of household wastes (Figure 1).

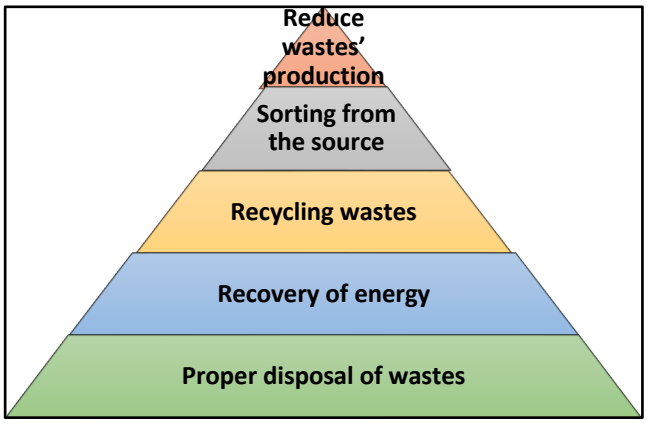

Figure 1. Options for integrated and sustainable management of household wastes.

The hierarchy of the sustainable household wastes' management processes illustrates that it stands for a heuristic method being widely accepted all over the world, arranging household wastes' management options according to the best option ever for the environment.

2 - Stages of the household wastes' sustainable management.

The sustainable management of urban solid wastes, inclusive of household wastes, consists of five stages, namely:

A - The phase of reducing waste production. This phase actually precedes the production of wastes and aims to encourage the use of smaller quantities of materials to facilitate their sustainable management, in addition to reducing their impact on the environment. However, this can be attained by using less hazardous materials in terms of design and manufacturing while maintaining the use of durable and safer products for reuse for a longer period.

B - The phase of reuse. It stands for the first phase after the production of wastes, as it is considered a way to reduce the spread of wastes by reusing the same as they are without making any changes thereto. Nonetheless, the word "reuse" means "use the product either for the same purpose or for other purposes without the need for a manufacturing process, the method of which is considered better than recycling for the reason that it uses the same material without going to the manufacturing phase again, which needs to use additional energy, and has several economic and environmental benefits.

C - The phase of recycling. It represents the processing and recycling of wastes either into a new material or product, as this process makes the materials more competitive in the market: moreover, it preserves the environment and natural resources.

D - The phase of energy recovery. This phase involves the use of wastes resulting from reuse and recycling processes, and can be performed by destroying materials in order to obtain the energy they contain. Consequently, energy recovery should target materials that are defective in quality or components or which are not recyclable, in accordance with the optimal and efficient use of the recovered resources.

E - The phase of proper wastes disposal. It represents the last phase of the life cycle of household wastes, and it alike concerns wastes that cannot be recovered by reuse, by recycling or by energy recovery. Besides, wastes' disposal by technical backfilling is the optimal option for Sustainable Waste Management.

In the light of the facts set out above, it has shown clear that the **sustainable management of household wastes is the optimal method that can make wastes a source of economic development, reduce pollution and, most importantly, preserve the environment**.

Secondly. **The household wastes in the City of Constantine.**

I – General overview of the City of Constantine.

The City of Constantine occupies a strategic geographical position, which makes it suitable to be the capital and metropolis of an important weight in the eastern province of Algeria.

- Administration-wise, it is located in the heart of the province and represents one of the cities of its twelve municipalities; likewise, it is considered the centre of the province, township and commune, as well as the commercial, administrative, health and cultural centre of the province and the eastern region.

- More to the point, this city is alike characterized by a sensitive, highly categorized location characterized by a break in its topographic units due to the presence of the Rhumel Valley and Boumerzoug, steep slopes, hills and plateaus, which led to the lack of flat and levelled land that can be reconstructed, the fact of which was reflected on the morphological structure of the city, as it prevented continuous urban expansion and dependence on the form of circular propagation to match the topography, as this directly affected the methods of collection and transportation of household wastes within the city.

- In actual fact, the City of Constantine consists of 10 municipal delegations, in pursuance with the Executive Decree No.19-269 dated 07th October 2019, pertaining to the rezoning of the urban area of the City of Constantine (Map No.01).

II – The amount of household wastes in the City of Constantine.

1 Discrepancy in the amount of the daily produced household wastes in the City of Constantine.

In recent years, the City of Constantine has witnessed a variation in the quantity of the daily thrown out household wastes between high and low, the fact of which is due to several factors (Figure 2).

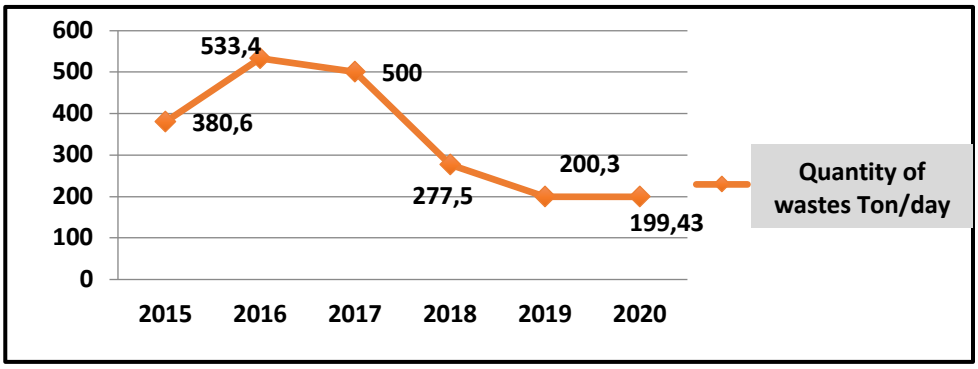

Figure 2. The evolution of the household waste' quantity in the City of Constantine.

Indeed, this apparent inconsistency in the quantity of household wastes can be linked not only to the number of residents, but alike to the available material means. Nonetheless, in 2015, the quantity of household wastes reached 380.6 tons/day, which had dramatically and frighteningly increased during the years 2016 and 2017 to 533.4 and 500 tons/day, even with the continuous decline in the number of residents of the City of Constantine as a result of the deportations that took place at that city. Above and beyond, this increase is due, according to the statement of the waste management official in the municipality of Constantine, to the absence of a weighbridge at the "IbnBadis" Technical Backfill Centre, where the quantity of household wastes is calculated by the size of the truck as a whole and not the quantity of wastes contained therein; i.e., the higher the number of trucks, the higher the quantity of household wastes, correspondingly.

As for in 2018 and 2019, the quantity of household wastes decreased to 277.5 and 200.3 tons/day, which is due to the transfer by the City of Constantine of its household wastes to the "kilometre 13" Road of Ain Samara, which contains a weighbridge, which alike witnessed, in 2020, a slight decrease in the quantity of wastes, to the order of 199.43 tons/day.

Finally, it can be stated that the quantity of household wastes in the City of Constantine is not only related to the number of residents, but is closely related to the availability or absence of means and material possibilities for managing such type of wastes in the city. In addition, the quantity of wastes in the city varies from season to season, as it rises in summer and autumn and decreases in winter and spring (Figure 3).

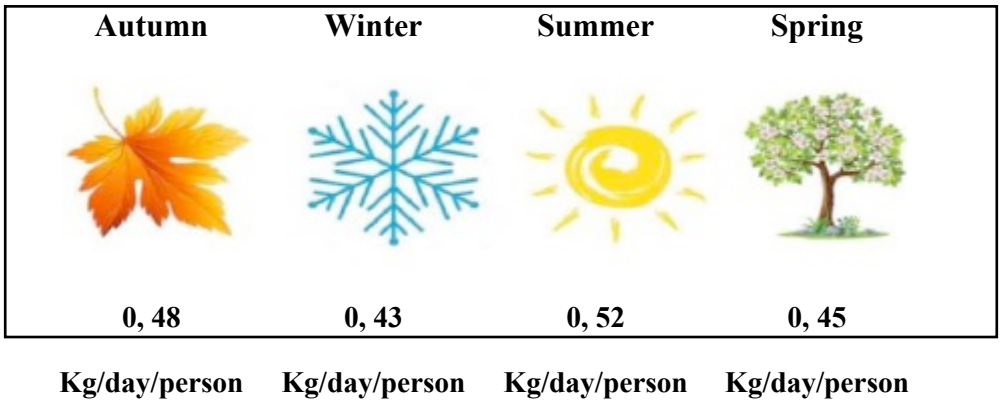

Figure 3. Quantity of household wastes by seasons in the City of Constantine.

2 - Significant development in the composition of household wastes in the City of Constantine.

Indeed, the household wastes in the City of Constantine have known a clear change in their composition, both in terms of the discharged quantity and in terms of the type of produced materials, as new materials have appeared; the fact of which is primarily due to the improvement in the standard of living and the constant change in the consumption pattern of the Algerian citizen.

a - Domination of organic substances on the composition of household wastes for the two years 2000 and 2005.

In the light of the examination and comparison of the composition of household wastes in the City of Constantine, for the two years 2000 and 2005 (Figure 4) we noticed a slight increase in the percentage of organic wastes, from 68.06 % in 2000 to 70 % in 2005; on the contrary, the percentage of paper and cardboard decreased from 21.27 % to 11 %, the fact of which is due to the emergence of the idea of recycling them and getting benefit therefrom. As for plastic, it has alike witnessed a significant increase from 05 % in 2000 to 13 % in 2005, as this is a result of the entry into the Algerian market of lots of these short-used products that are used once and then thrown away (disposable products), in respect such as plastic utensils, water and drinks bottles, plastic bags ... etc. In addition to the increase of the percentage of minerals from 01 % to 03%, the fact of which is due to the presence of significant amounts of metal packaging materials, in respect such as cans, like tomatoes, fish, vegetables ... and the like.

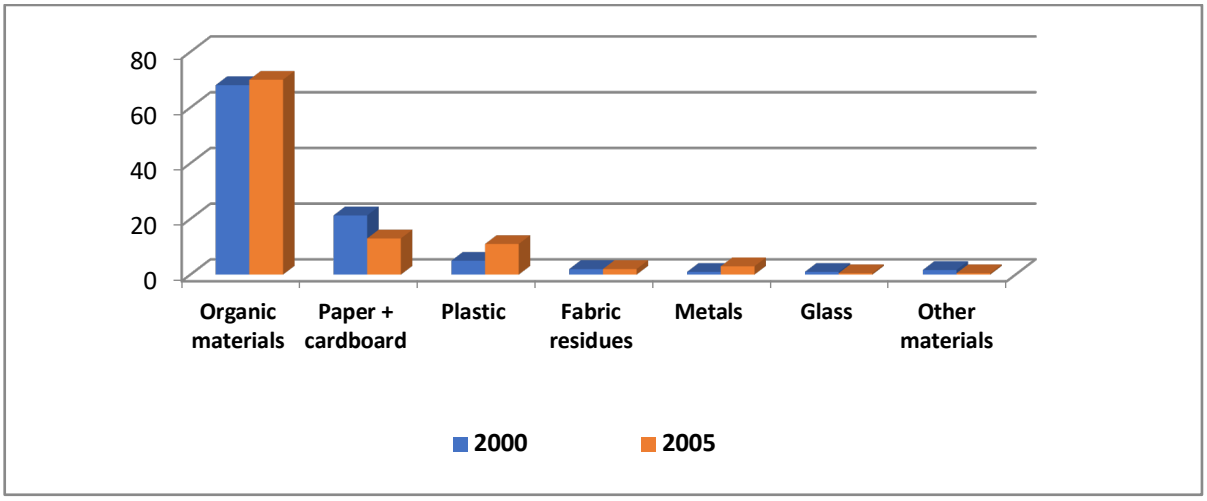

Figure 4. Composition of household wastes in the City of Constantine for the two years 2000 and 2005.

Based on the composition of the household wastes of the City of Constantine, we noticed the appearance of new components in comparison with previous years (Figure 5).

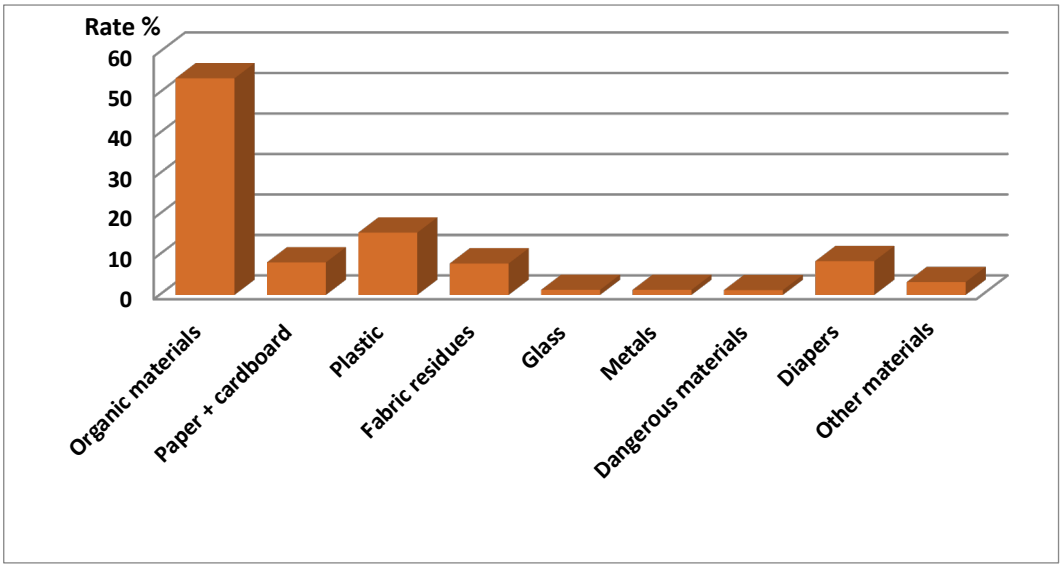

Figure 5. The composition of household wastes in the City of Constantine.

Unquestionably, new wastes such as **diapers** have appeared, which amounted to 08.34%, which is due to the natural increase and the change in consumption methods; **hazardous wastes**, which represent 01.20%, and includes more than ever the residual of medical drugs and the residual of electronic devices (mobile phones, batteries...etc). Moreover, we also noticed an increase in fabric residues to 07.78% and an increase in the percentage of plastic, which reached 15.41%, due to the heavy use of plastic materials.

As for paper and cardboard, we notice that its percentage has reached 08.05%, thanks to the recovery and recycling processes, and the same applies for metals. As for organic wastes, we notice a decrease in the percentage thereof, the fact of which is due to the constant change in the consumption style of the Algerian citizen, who is gradually moving from the consumption of organic materials to the consumption of canned materials.

In closing, we conclude that the **composition of household wastes in the City of Constantine** has known a **clear development**, as it has shown to be due to the emergence of **new wastes** that are foreign to Algerian society, in respect such as **diapers and electronic waste**, which are classified as **hazardous wastes**, in addition to the **continuous decrease** in **organic wastes compared to the rise of other wastes**, such as plastics and metals, as this has shown to be due to the **change in urban lifestyle, which affected their traditions and consumer habits**.

Thirdly. **Management of household wastes in the City of Constantine.**

I – Bodies responsible for management process.

In accordance with the various laws and executive decrees drawn up and enacted by the Algerian legislature, from independence to the present time, the **municipality** is the first body responsible for the management of household wastes, which management is either directly or indirectly through the system of public institutions, or even assigned to private dealers by concluding concession contracts.

In the City of Constantine, the role of the Municipality represented in the Directorate of Hygiene and Municipal Environmental Protection has became the supervision through monitoring, planning and organizing, whereat the City of Constantine was divided into 71 collection sectors. Moreover, the task of managing household wastes, in particular those related to their collection and transfer, was assigned to 04 bodies: The multi-service company for works and environment (SOPTE), the municipal public institution for hygiene of Constantine (PROPCO), the provincial public institution for hygiene and public health of the Province of Constantine (PROPREC), the small enterprises operating within the scope of the National Agency for Youth Employment Support

(ANSEJ) and the National Unemployment Insurance Fund (CNAC), and each body was granted a set of collection sectors (Figure 6).

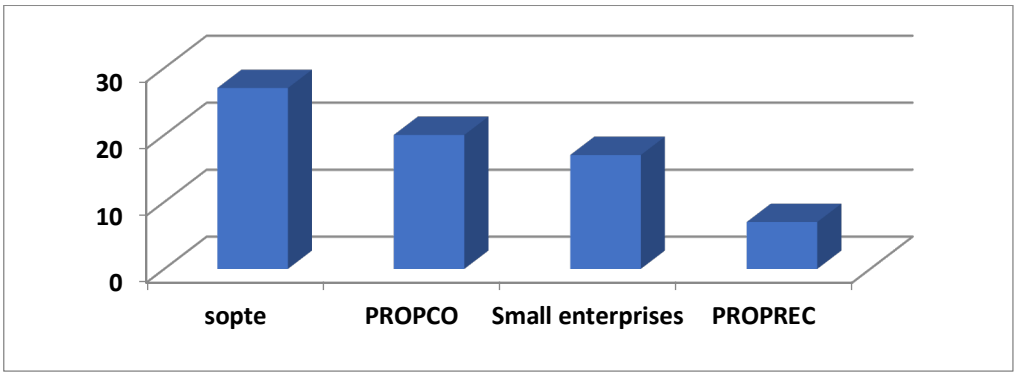

Figure 6. Distribution of the household waste collection sectors to enterprises.

II – The household wastes' management method in the City of Constantine.

The process of managing household wastes in the City of Constantine after disposal by citizens is carried out through three phases: Collection from containers, transportation via specialized trucks to **processing facilities and final disposal**.

1- Collection phase.

It represents the process of collecting household wastes from containers scattered in the neighbourhoods and streets of the City of Constantine. Above and beyond, this phase is characterized by the absence of a culture of sorting from the source in addition to the absence of selective collection containers, seeing that we find one container in which organic waste, plastic, cardboard and paper.... and other household wastes are thrown together.

Photo 1. Containers scattered in the City of Constantine.
Source: Photos taken by the researcher (March 2023).

More to the point, the collection process in the city is alike characterized by the division of its area into 71 collection sectors and 1411 collection points; nonetheless, this division was random and was not subject to any criteria or conditions pertaining to the number of residents, the number and types of houses, the density of urban fabric, the length and width of roads and streets and other criteria.

2 - Transportation phase.

Obviously, the bodies responsible for managing household wastes in the City of Constantine rely on a variety of equipment to transport such wastes to the processing centres, as their number reaches 131 mechanisms that vary between trucks (compactor trucks), tipper (Ampliroll), trucks (dump body), and lifting mechanisms (backhoe loader), in addition to agricultural tractors, but they are considered

insufficient to transport the wastes of a city whose size is like the City of Constantine that throws 199.43 tons per day.

1 - Processing phase.

Upon collection of the household wastes from containers and their and transpiration, the processing phase comes after, but the management process at this city lacks this phase, either recycling or energy recovery, except for sorting the said wastes at the sorting unit, whereat recyclable waste such as cardboard, plastic, ferrous and non-ferrous materials are recovered, and then sold to private dealers for recycling purpose.

Photo 2. Sorting the household wastes.

2 - Wastes' final disposal phase.

Upon sorting the recyclable wastes, the final phase of disposal of the remaining wastes comes in a safe and environmentally safe way, as they were disposed, with regards to the City of Constantine , at the Technical Backfill Centre of Bougharb, which is 42 km far from the City of Constantine and is of a total surface of 78 hectares allocated for the creation of 10 pits (levels); nevertheless, one pit with a capacity of up to 200,000 m^3 and three (lagoons) devoted for the processing of Leachate resulting from the landfill of household wastes, as the capacity of each one reaches 6000 m^3.

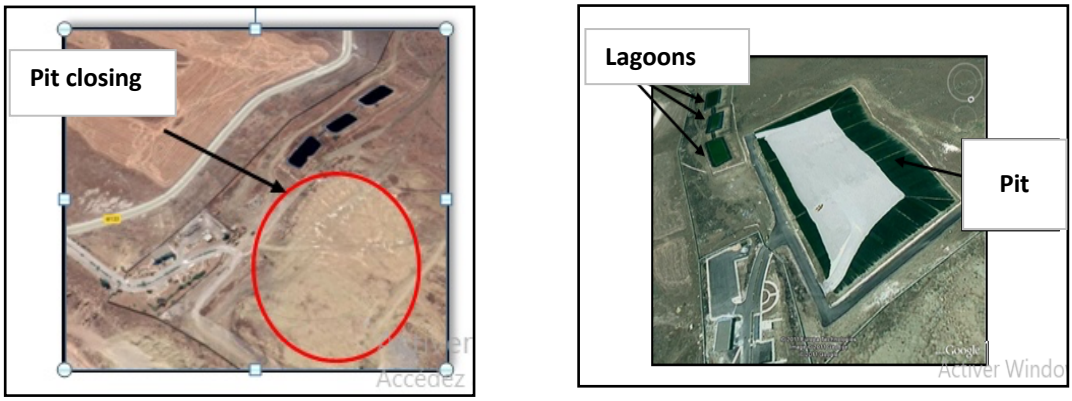

Photo 3. Technical Backfill Centre of Bougharb.

Nonetheless, the centre was closed in 2015 after saturation of the pit, whereat the wastes of the City of Constantine were directed to a number of controlled and random dumps, thus returning to the traditional disposal of household wastes, as per summarized in Figure 7.

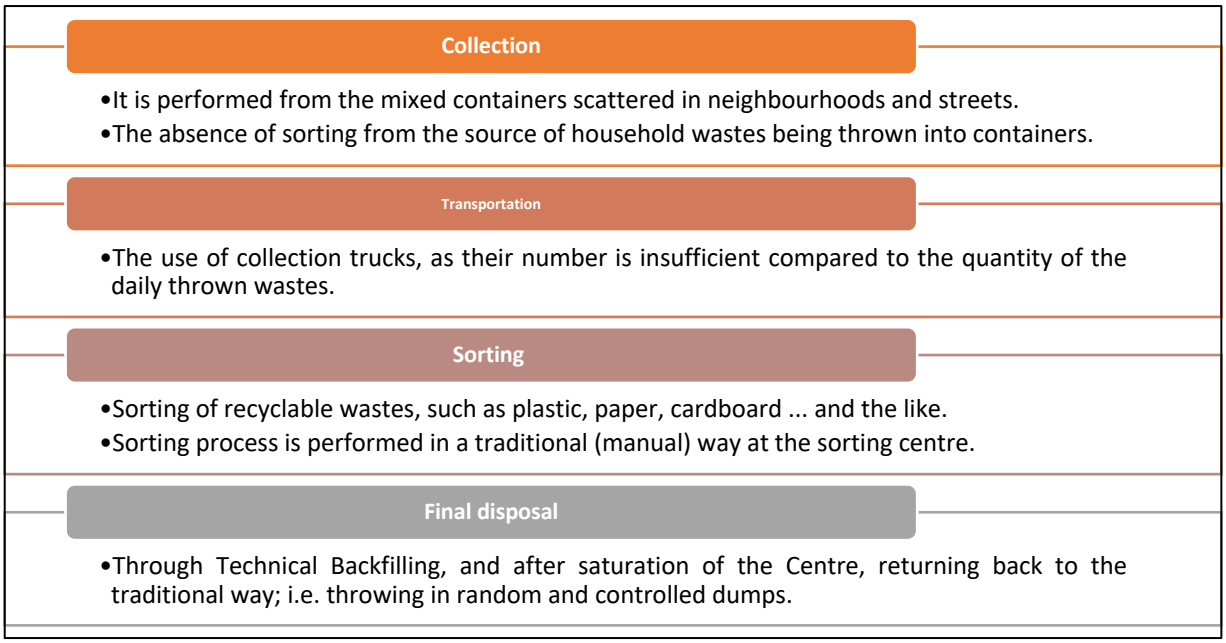

Figure 7. Traditional management of household wastes in the City of Constantine.

III – The sustainable management and traditional management in the City of Constantine.

In fact, the management of household wastes in Constantine is still conducted in a traditional way without relying on the concept of sustainable development, as a concept aimed at sustainable wastes' management by reducing the production thereof; however, upon generation of the same, priority is given to the process of reuse, then recycling, then recuperation through energy recovery and finally proper and safe disposal thereof.

Nevertheless, for confirmation purpose, some sustainable development indicators can be applied, which measure the performance of cities in achieving sustainable environmental development through the sustainable management of household wastes, which are specifically three types: environmental, institutional and financial.

1- Environmental indicators.

As a fact of matter, the household wastes produced by man during his various activities harms the environment, and depletes its resources; as this has led to the development of a set of indicators to find out which wastes are produced and which resources are consumed, together with the ability of nature to renew them and absorb various waste products. Besides, we selected therefrom the **household waste productionindicator** (**ton per person per year**), which indicator is measured according to the following method:

(**Quantity of wastes per ton** / **Population per year**), which reflects that the higher the quantity of wastes produced per year than the population, this indicates that there is a wastage of resources, together with the failure to follow the appropriate methods of reuse and recycling, and vice versa, as this results in a social phenomenon known as the *Nimby Phenomenon*.

However, through the application of this indicator to the City of Constantine, we found that:

- The quantity of household wastes disposed of by an individual per day is assessed to 0.48 kg, which is a large amount, thus reflecting the consumption of city residents of wastes that are not recyclable or reusable, the fact of which has resulted in the emergence of a social phenomenon known as *Nimby*, which is an abbreviation for the phrase (Not In My Back Yard), being an expression indicating the opposition of residents to the proposed technological development in any a specific area in any fields of life within the city.
- **In the City of Constantine, this social phenomenon is strongly highlighted in the field of household waste management** as a result of the **residents' refusal to reduce waste production through reuse of the same, together with refusing to sort their wastes at home and disposing them**

off into environmental containers, from which the city benefited in 2015, being dedicated to organic wastes and recyclable wastes; thus, making the municipality dispensing with it completely.

2- Institutionalindicators.

Public and private departments and institutions are considered the executive organ of the State, through which the sustainable management of household wastes is applied. Furthermore, we selected the indicator of the **sustainability of processing facilities** as it is related to the process of adapting facilities and institutions to technological development and needs.

More to the point, upon application of such indicator to the City of Constantine, we note that the institution responsible for the processing procedure, represented by the Public Institution for the Management of Technical Landfills and the Waste Processing Centres at the Province of Constantine, stands for "an institution of an industrial and commercial nature" that **has not yet adapted and has not kept pace with the technological development in the field of domestic wastes processing and taking advantage thereof, whereat the performance thereof is limited to manual sorting recyclable wastes and selling them to private dealers, whilst the remaining wastes shall be disposed off at the landfills**.

3- Financial indicators.

The money collected from various processes of the household waste treatment, together with the taxes imposed against violators, contributes to being acquainted with the extent of attaining sustainable development through the sustainable management of such wastes. Moreover, we have selected an indicator from which **application of special royalty for the index of fairness**, as this indicator is related to the distribution of financial costs in a fair and equitable way, thus allows making sure that the producers of non-domestic wastes contribute financially to the public service of wastes through paying fees. Thereof, this indicator is calculated as follows:

The percentage of wastes generated by the activities in the total household waste for the Year N = A, and the percentage of financial contributions of the activities (producers of the special royalty premium tax on raising household wastes actually paid, and the status invoice at recycling plants) for the Year N = B. Subsequent to which, the **index of fairness and equity is equal to: B/A**.

- If the percentage is 01, this means that this is fairness.
- If the percentage is < 01, this means that it is in favour of households.
- If the percentage is > 01, this means that the financial transfer is made at the expense of households.

By applying this indicator to the city of Constantine, we found that non-domestic waste producers in the city do not pay fees for their production, and therefore do not contribute financially to the public service for household waste management.

Conclusion.

In the light of our review of this subject matter, it clearly illustrates the importance of sustainable management of household wastes as a new mechanism to solve the problem of managing household wastes in cities as an integrated method that covers all management phases from an environmental, institutional and financial point of view, together with the need to choose the appropriate solutions for attainment purpose of sustainable development through sorting from the source, reuse, recycling and pre-processing of wastes, and then final disposal thereof to reduce its impact on the environment. In virtue of which, a set of the conclusions and recommendations hereunder has been reached:

- Variation in the quantity of household wastes produced on daily basis in the City of Constantine from year to year, the fact of which is due to several factors, in respect such as the number of residents, purchasing power and available material means.
- The emergence of new wastes in the composition of household wastes in the City of Constantine, in respect such as diapers, which amounted to 08.34%, as this has shown to be the result of changing consumption methods, whereat the mother used to reutilize cloths; however, she nowadays uses diapers once only.
- The discharge of the municipality from the direct management of wastes in the city, whose role is now limited to monitoring, planning and organizing public and private institutions that have been entrusted to the process.

- The traditional management of household wastes in the City of Constantine, whereat it is limited to collection, transportation and sorting at stations and finally disposal without any processing in random and controlled dumps.
- The absence of the concept of sustainable development in the management process at the city level, upon application of some of the sustainable development indicators that measure the type of provided service.
- Variation in the quantity of household wastes produced per day in the City of Constantine, from year to year, the fact of which is due to a combination of factors.
- The departure of the municipality from the process of direct management of household wastes in the City of Constantine, and **being limited to monitoring, planning and organization for public and private institutions that were assigned to the process**.
- The division of the area of the City Constantine into ten delegations, together with granting each delegation a set of collection sectors. Nonetheless, it is considered only an administrative division in the field of managing household wastes, **as the president of the delegation has no role or influence in the process of managing household wastes at the city level**.

The division of the area of the City of Constantine into 71 collection sectors and 1411 collection points; **however, this division was random and was not subject to any criteria or conditions related to the number of residents, the number of dwellings and their patterns, the density of the fabric, the length and width of roads and streets and the like, the fact of which has negatively affected the collection process**.

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