International Journal of Innovative Studies in Sociology and Humanities
ISSN 2456-4931 | Open Access | Volume 7, Issue 6, 2022
DOI: https://doi.org/10.20431/2456-4931.0706015

Industrial Waste - Case of the Industrial Zone "Palma" -Constantine City-

KABOUCHE LINA[1], Pr. KHALFALLAH BOUDJEMAA[2], Pr. ALKAMA DJAMAL[3]

[1]Faculty/Institute : Urban Technial Management, PHD degree : third year, Mohamed Boudiaf University- M'sila.
[2]Faculty/Institute : UrbanTechnial Management, Professor, Mohamed Boudiaf University- M'sila.
[3]University of 8 Mai 1945, Guelma. Algeria.

Abstarct

The industrial boom and the industry development growing in the last decade is, undeniably, a major element contributing to the economic development of the country. This development is often equated with the destruction of the environment and is accompanied by impacts on both nature and ecological system. While industrial spaces have become, in fact, the origin of the problems caused to the urban landscape and inextricably linked to the damage that the environment suffer from given the multiple sources of nuisance: liquid, solid and gaseous that are generate it. The industry of Constantine, as a result of its location integrated into the urban space, especially at the level of the industrial zone "Palma ", the nature of the industrial activities and untreated wastes released into the environment contribute significantly to the degradation of the quality of the urban environment. However, there is a lot to doby the industrial sector and the state concerning the awareness of environmental considerations at the level of the city.

The ambition of this article is to identify the impact of wastes and discharges of industrial companies at the level of the industrial zone "Palma" in Constantine on the natural and urban environment of the city of the old rock. It is also to know the industries located in this area and the types of wastes and the danger that can be generated by these industries in order to develop the subject of industrial wastes with a global vision.

Key words: industrial zone - industrial waste - pollution - industrial institutions- Palma.

INTRODUCTION

The development of the industry growing this last decade is, undeniably, a major element contributing to the economic development of the country. This development is accompanied with impacts on both nature and ecological system, and these of industrial spaces have become, in fact, the origin of the problems caused to the urban landscape and inextricably linked to the damage that effect the environment, taking into account the multiple sources of pollution: liquid, solid and gaseous that it generates.

Industries are producing wastes that constitute the visible part of their negative impacts on the environment, natural and urban, depending on the type of industry and technologies used: whereas, the responsibility of the management of these wastes (from their collection up to their revaluation) is the responsibility of the company that has produced them. The majority of the wastes that it produces are incinerated or put in a landfill, which leads to the emissions of micro-pollutants in the air, emissions of gas due to greenhouse effect, soil contamination, and hydraulic pollution.

In Algeria, the industrial areas located throughout the national territory contribute to the production of waste losses during the manufacturing phase of the product or in the industrial processes of companies belonging to different sectors of economic activities. Concerning industrial wastes (including simple industrial wastes), the latter records an annual production of approximately: 2 550 000 T/year, among which, the special waste represents approximately 330,000 Tons/year, and the health care and infectious risk wastes(DAS/DASRI) approach 30000 Tons/year (2011) ("ANGED" Avril 2014).

Today, the economic development of Constantine, which is based essentially on the industry, is in a critical situation. Because of these industrial sites that have been implemented on the outskirts of the city without prior studies of the impact on the urban and natural environment, that today these sites are overrun with new urban settlements. This is the case with "Boussouf" district, located in the south-west of the city and its nearby areas of activity "Lamoricière", "Rhumel ", and the industrial zone "Palma".

The latterwas inserted into the urban fabric of "Constantine" and considered among the first areas carried out in the city, implemented without prior impact assessment on the natural environment and located at the long river of water. Facing this problematic growing situation, some questions arise: what is the environmental and ecological impact of industrial discharges of the industrial zone "Palma" on the natural environment of the city of "Constantine"? And how to reconcile the management of industrial wastes with the protection of the environment?

This subject is even more relevant, and it is important to reflect on the future of our planet and environmental quality of our countries. It seems that the industrial zone"Palma"has a disastrous environmental impact and affects even the non-industrialized areas around this area. It leads to the pollution of rivers, the alteration of the quality of the soil, a threat to the quality of the air, the over-consumption of water and energy, and especially the production of great quantities of wastes that are not recyclable and dangerous. To limit the damage caused by industrial areas, it is high time to forge the concept and the approaches of sustainable development and to implement a certain numbers measures: to limit the emissions to air and discharges to water and soil, increase recycling rates, reduce packaging …etc.

METHODS AND MATERIALS

before studying in detail the problem of industrial waste in the industrial zone " Palma ", and in order to achieve our research objectives and answer the questions, this paper begins with the interpretation of all the information collected through the literature search on the topic and the investigations on the field, which have been based on : the interviews with the managers and the workers in industrial plants in the industrial zone "Palma", the observation through these on-site visits, the findings, and the taken photography. This is in addition to the information collected from different departments and directorates concerned: the property management company of Constantine province (SGI), the environment department of Constantine, and the national statistics office (ONS) are the main tools used in this research. The treatment of such subject has demanded:

- An investigation work on the field at the level of the industrial zone, which is based on a questionnaire. We distributed 1000 questionnaires among people who work in the factories at the level of Palma area. We have done the survey door-to-door with the workers; therefore, we received the total number of our questionnaires.
- Direct Interviews with the manager of the company's factories in the industrial zone. These interviews were conducted in appropriate conditions with the exception of few difficulties due to the managers who have not agreed to answer our questions.
- The study was carried out according to the data entered by 23 industrial establishments.

THE CONCEPT OF INDUSTRIAL WASTE

What is Industrial Waste?

Most industries lead to discharges and wastes during the manufacturing process of the products or industry processes. The industrial wastes are distinguished from household wastes by the faster variation of their composition, quantities produced, and equally by the wide variation of their toxicity depending on the type of activities. We can say that industrial waste "is a waste generated by industrial activity" (Damien 2004).

According to article 89 of law no. 83-03 of February 1983 on the protection of the environment: "Is considered as a waste according to law, any residue from production process, of transformation, or use, any substance, material, product or, more generally, any property, movable dropped or that its owner intended to abandon " (Loi n°83-03 du 5 février 1983 relative à la protection de l'environnement, article 89. s.d.). According to this article,we can say that industrial waste can exist in several forms within the same industry, and it can be differentiated according to their specificity, their complexity, and their dangerousness. This type of waste product in the short, medium, or long terms constitutes a source of negative impact on the ecosystem components, and the environment in which they are produced, stored, or manipulated, and their specific properties give them undeniable effects on the human health.

Categories of Industrial Waste

Industrial wastes include materials of various natures (solid or liquid cleaning residues, manufacturing waste, packaging … etc.).A typology of waste could be varied depending on their origins and nature, their collection and treatment mode in appropriate centers, or their more in less pollutant characteristics in order to reduce their impact on human health and the environment. It is possible to classify the waste into three broad categories:

Special Industrial Wastes

More commonly known now as hazardous wastes(HW), contain variable quantities (écologique 24 février 2022)of toxic or hazardous elements containing harmful or toxic pollutants with more or less strong concentration. For example, wastes containing arsenic, lead, hydrocarbons …etc, posescertain risks to man's health and to the environment. Each waste producer must characterize and classify the waste. The regulation of waste dangerousness characterization has evolved significantly in recent years by an action of the European Commission and its member States to prevent the risks to the populations and the environment and more specifically to converge the classification of substances and mixtures, and their labeling (écologique 24 février 2022).

Non-Hazardous Industrial Waste (NHIW) or Non-hazardous Waste

The Non-Hazardous Industrial Waste are solid wastes in their raw state, which are of a nature similar to household wastes and elimination and treatment channels are comparable to those of household waste (Guittonneau s.d.).They are wastes of non-pollutant and non-biodegradable mixture, do not produce any chemical effect, and do not damage the materials in case of interaction in a way that may cause harm to the environment or to public health. Moreover, we equally speak of non-hazardous waste (NHW) (Mayar s.d.).It isa majority of wastes from administrative and office activities(furniture, packaging, materials …etc.), building industry and public works (concrete wastes, bricks, tiles ...etc.), and food wastes. This type of waste is often stored in waste collection centers and treated the same way as household waste.

The recycling and the processing of industrial wastes start by sorting each of the wastes in order to isolate the different materials used. The waste is then shredded, compacted, and then routed in the form of balls to appropriate recycling centers. Most of the non-hazardous industrial wastes are valued in order to produce secondary raw material from plastic waste, paper and cardboard, or glass for instance. The wastes that cannot be recycled are incinerated (environnement s.d.)

Inert Industrial Wastes

Inert wastes are mineral wastes or equivalent to the non-polluted natural substrate. They do not produce any biological, physical, or chemical reaction in a manner likely to cause pollution of the environment or harm to human health. The re-use and recycling of this type of wastes should be encouraged as soon as they are possible. While some waste cannot be recycled, they should not be mixed with other waste and must be disposed of in repositories or storage facilities, specialized. However, their transport and their preparations have a significant impact in terms of CO2 emissions and land use (Jean-Michel 2011). While the recovery, recycling, and re-use of this type of waste is required as the most appropriate system of management and which should be encouraged in order to limit their impacts on human health and the environment.

The Recovery of Industrial Waste

Because of their complexity, which requires a treatment by specialized collectors, the valuation of industrial waste is among the necessary management methods that can be applied for economic reasons and especially environmental reasons. The valuation involves the implementation of operations that make waste useful and that can, or cannot, pass through its transformation (or treatment). It is set in the EQA as"any transaction intended by the reuse, recycling, composting, regeneration, or by all other action that does not constitute elimination to obtain items, useful products, or energy from waste materials" (Tanguy 2017). There exist different types of valuation:

The valuation of material

- **The Re-employment:** it is to use once again a used product or object for a purpose similar to that of its first use or for other use without there being any intermediate treatment. An example of that is depositing bottles that are refilled again, after their cleaning (Khouildi Sayeh, Hamdi Meftah 2016)
- **The Re-use:** This phase is to use again the industrial waste differently. Recycling centers have the mission of promoting the re-use or re-employment, and, after recovering the waste in the waste disposal centers or by voluntary contribution of individuals, the waste is sorted, cleaned, repaired to be able to be resold (Julia 2006).
- **Recycling:** recycling allows reintroducing new materials or products of years of waste in the consumption or production cycle; therefore, it enables to give a second life to an object. Preferred for metals due to the strong impact

of their production, recycling is often compared to energy recovery by thermal means (incineration, gasification) for municipal waste of paper, cardboard, and plastic type (Bovea. M. D, Ibáñez-Forés. V, Gallardo. A, Colomer-Mendoza. 2010). The improvement of industrial waste recycling and the reduction of waste volume form a priority challenge for the environment, the ecosystem, and the economic performance.

The Natural Organic Matter

It is the whole of the modes of management and valuation of biodegradable waste (agricultural waste, industrial sludge, waste from the agro-food industries ...) which becomethen an excellent source of energy or composting. Depending on their nature, these waste productscan be valorized via two modes: composting or anaerobic digestion.

- **Composting:** Composting is an enhancement biological aerobic solution (in the presence of oxygen), which accelerates the natural decomposition process of fermentable wastes by micro-organisms under controlled conditions. It produces carbon dioxide, heat, and a stable fertilizing substance rich in humid compounds: the compost ((FNADE) 2015). Several techniques of composting exist: individual, shared, and industrial, which are carried out in several steps: waste preparation, fermentation, screening, maturation, and storage.
- **Anaerobic Digestion:** anaerobic digestion is a solution of anaerobic valuation, which accelerates the natural process of decomposition of putrescible waste by micro-organisms under controlled conditions. It allows to generate a moist substance that is rich in partially stabilized organic material called fermen table, which is either returned to the soil directly or after a phase of composting. The digestion process is also accompanied by the production of biogas rich in methane that is energetically recovered (PAPREC s.d.)

Energy Recovery

In fact, most of the waste that cannot be recovered in the form of matter may now be, in the form of solid or gaseous fuels to produce energy, without risk to the environment (PAPREC s.d.).At the level of industrial facilities, this type of valuation is to use the waste industry as a fuel alternative to produce electricity or thermal energy resulting from the incineration or thrombolysis.

Presentation of the Industrial Zone " Palma "

The industrial zone "Palma" was created in 1976, the Algerian authorities in order to expand the industrial fabric of Constantine city after the independence. The industrial zone "Palma" is located in the south-west of the city of Constantine,and is located in the urban fabric of the city and covers a total area of 73, 38 ha.It is bordered by the national road RN5 to the north, the industrial zone"24 Février1956» to the East,"Rhumel"activity area to the west, andwadi"Rhumel"to its southern part. The area is surrounded by several cities of habitats and new urban habitat zones, such as: 20 Aout 1955town,"Benboulaid"town,"Boussouf" new urban habitat zone,"HassaneBoudjenana" town, and 5 Juillet1962 town. The total gross area ofI. Z. Palma is 73 ha, 38 a and77 ca, whereas the total area of lots is estimated at 58 ha, 79 and 97 ca (Centre d'étude et de réalisation en urbanisme s.d.), an average of80% occupancy of total surface area.

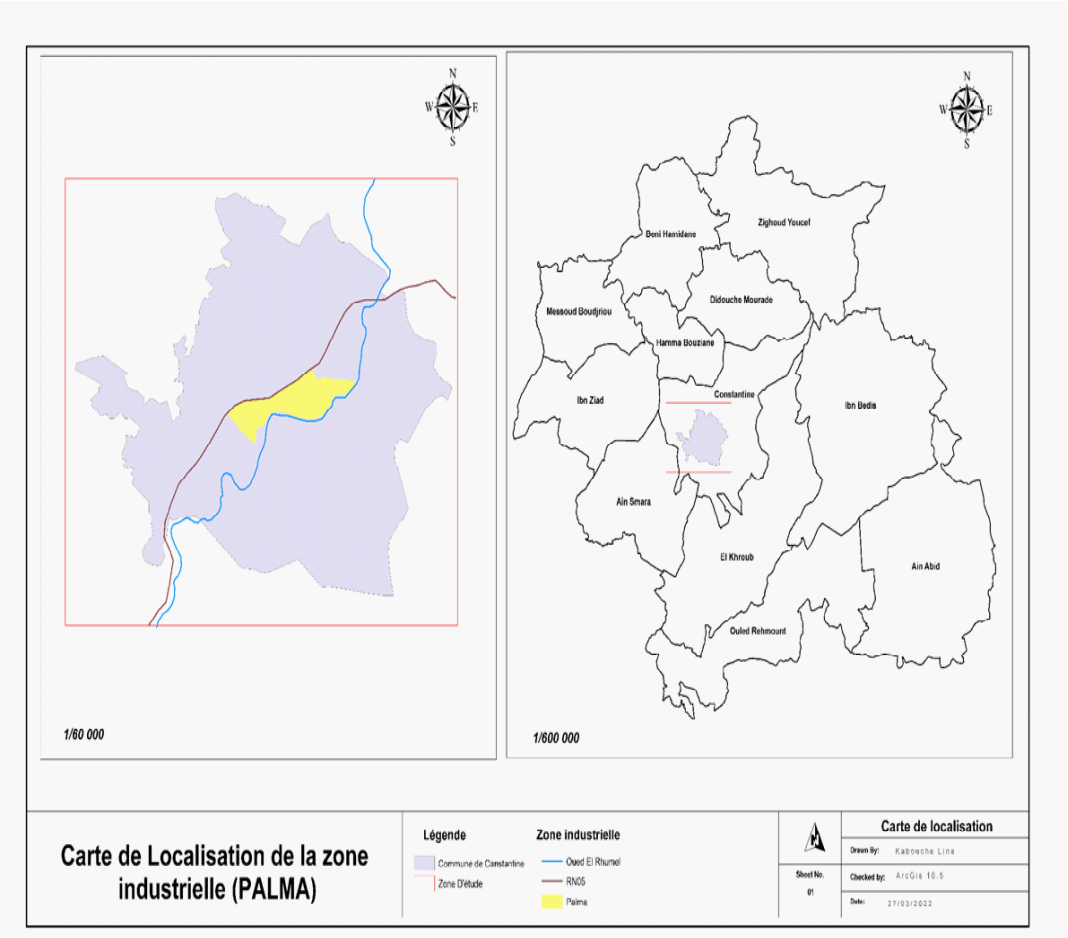
Activities and economic sectors

The industrial zone "Palma"is among the most important industrial zonesof the city.Itis very diversewhen it comes to the economic activities that exist. Field investigation and data collected from different concerned departments on a total of 85allotments of different activities have clearly demonstrated that "Palma" is no longer a productive zone.

In itself, it combines more than 60% of its total surface zone reserved for storage, services, orgovernment seats (energy transport and gas administration, the technical construction inspection, the bank administration, AlgérieTélécom, the insurance company)distributed over different locations of the area. This is because of its location in the urban fabric of Constantine city, which facilitates the transport ofgoods, and a few private companies that have rented some land and transformed it into storage areas.

Then comes a seriesof industries of different natures, but there is a large concentration of pharmaceutical industries and other businesses related to food industry, furniture, energy production and gas, and dairy products manufacture of (ECHOUROUK MILK).

The warehouses correspond to deposits of pharmaceutical products, tiled floors, and energy transportand gas-company. The rest of the lots correspond to services and business activities: there are village halls, automobile dealers, and commercial premises…Etc.Note also that some of these services are new and built on land formerly uncultivated.



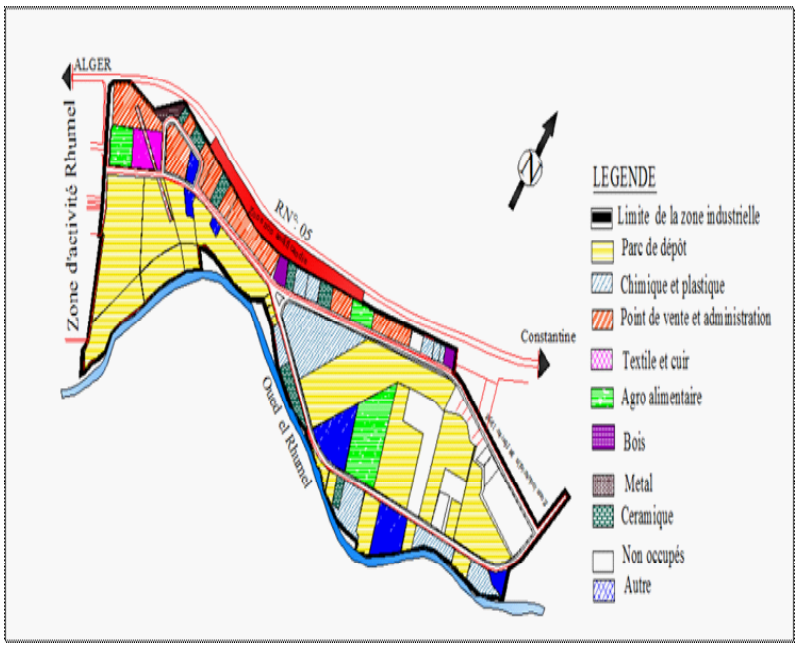


Figure 2. Typology of activities in the industrial zone "Palma"

RESULTS AND DISCUSSIONS

The industrial wastes that are not adequately treated are found in the environment and constitute an atmospheric, visual, lithospheric, water, and olfactory pollution. When these wastes decompose, their components (mercury, fossil carbon, lead, cadmium, solvents, heavy metals, acids, and hydroxyl sludges, etc.) persist in Naturefor periods of more or less long. They can be harmful to the environment and damaging tothe human health.

In order to identify the types of discharges in the industrial zone"Palma", we have distributed 23 questionnaires to heads and managers of industrial establishments at the level of the area. We have made the survey door to door, so we have received the full number of the distributed questionnaires**.**

The questionnaire consists of 20multiple choice or closed questions and simplified in order to meet the need of clarity and fast answering: - A first part of general information on the establishment and the types of wastes generated through the activities of this establishment.

- A second part of questions related to the waste management and the adopted policies to manage the company wastes.
- Finally, a third and last part of questions on the importance of environmental concerns within the institution.

Statistical Processing of Data

This part will include a statistical analysis of the data collected during the data collection, which took place between November 10th and December 28th, 2021. The data were processed with the SPSS software (Statistical Package for the Social Sciences). After the definition and coding of independent variables, dependent variables, and input data, we obtained a response rate of 100% (23in out of 23).We have started with measuring the coherence degree of data to from the Cronbachtest, which was higher than 0.6 because equal to 0.708; therefore, we find that the overall reliability of the results is good.

Table 1. Response Rate to the questionnaires

		N	%
Observations	Valid	23	100.0
	Excluded[a]	0	,0
	Total	23	100,0

Source : Results SPSS

Table 2. Cronbach reliability test

Alpha Cronbach	Number of items
,708	19

Source : Results SPSS

- ✓ **First part:** It is to determine the waste types generated through the industrial activities of establishments at the level of the industrial zone"Palma".

Table 3. general information on industrial plants

		Frequency	Percentage
What is the legal status of your industrial establishment?	public	1	4,3
	private	21	91,3
	public-private	1	4.3
	Total	23	100,0
What is the activity sector of your institution?	administration	3	13,0
	commercial activity	1	4,3
	services	2	8,7
	industry	17	73,9
	Total	23	100,0

What type of product do you manufactureat level of your company?	pharmaceutical products and drugs	11	47,8
	food and dairy product	5	21,7
	gas and energy product	2	8,7
	furniture product	2	8,7
	other	3	13,0
	Total	23	100.0

According to the results of the questionnaire, most of the establishments located in the industrial zone "Palma",that is 73, 9 %,are industrial establishments that belong to the private sector that is 91, 3 %. For the products type at the level of the zone "Palma", 47.8% of these industrial establishments manufacture medicines and pharmaceutical products, while 21, 7 manufacture food and dairy products.

Table 4. physical State of the waste, and their type

		Frequency	percentage
What types of waste your establishment generates	special waste hazardous	11	47,8
	harmless waste non-hazardous	10	43,5
	inert waste	1	4.3
	other	1	4.3
	Total	23	100,0
What is the physical state of the waste generated by your establishment	solid	11	47,8
	liquid	8	34,8
	gaseous	4	17,4
	Total	23	100.0 a

Source: SPSS results established by the researcher

The category of the most dominant industrial discharges generated by the industrial establishments at the level of the industrial zone «Palma» is the category of special hazardous wastes with a percentage of 47.8 %, and 43.5 % for harmless non-hazardous wastes. Concerning the physical state of these discharges, 47.8% are of solid wastes while 34.8% represent the liquid discharges.

The industrial zone «Palma» produces, for itself only, thousands of tons of solid industrial wastes. This amount also includes waste types other than those coming from manufacturing and construction industries, and where the manufacturing of dairy and pharmaceutical product predominates. The average composition of industrial waste varies considerably from one type of industry to another.

In Algeria, the amounts of solid industrial waste are not taken into account in the general statistics ofwastes, and they are included in the flow of municipal solid wastes and are not treated as specific flows, hence the difficulty to obtain specific data and specific to the industrial waste zone « Palma «.

Data related to the discharge of gaseous industrial waste are obtained through the bias of surveys and interview. This type of wastes is constituted by factories' emissions of a wide variety of gas in the air: carbon dioxide (CO2), the gas contributing to the greenhouse effect, volatile organic compounds, nitrogen oxides (NO) and sulfur (SO2), dust, and unpleasant odors. This mainly comes from fuels, incineration, or discharge of certain pollutants beyond a certain threshold.

- ✓ **Second part:**specify the behaviors of heads and manager in the field of industrial waste management and the policy adopted in order to manage wastes of industrial establishments, which resulted in points for the following :

Table 5. The waste management within industrial establishments

		Frequency	percentage
Do you monitor the amount of industrial waste generated by your establishment?	yes	9	39,1
	no	8	34,8
	partially	4	17,4
	I don't know	2	8,7
	Total	23	100.0
For your establishment, waste management primarily constitute	an environmentalconcern	8	34,8
	an economicchallenge	2	8,7
	a way to streamline the operation of your services	2	8,7
	constraintsor obligations	6	26,1
	other	5	21,7
	Total	23	100,0
Does your organization know all the regulations applicable to each type of waste?	yes	10	43,5
	no	4	17,4
	partially	9	39,1
	Total	23	100,0
Has your industrial establishment made orsubcontracted services for the collection and/or transport of these wastes, which are destined for a landfill, an incinerator, a waste treatment plant, or a transfer station?	yes	16	69,6
	no	6	26,1
	other	1	4,3
	Total	23	100.0

39,1% of the industrial establishments follow up the amount of their industrial waste whereas 34.8% report that it is difficult to monitor and assess the amount of industrial waste. This is due in part to uncontrolled releases. While 34.8% insist that, the proper management of this waste is an environmental concern.

43,5% of the industrial establishments confirm their knowledge of the regulation applicable to each type of waste generated by their industrial activities and that they are aware of the negative effects of their waste, and that accounts for 69.6% of these industrial establishments has performed or subcontracted services for the collection and/or transport of these wastes, which are destined for a landfill, an incinerator, a waste treatment facility, or a transfer station**.**

Table 6. The methods of waste management within industrial establishments

		Frequency	Percentage
Which method of treatment is provided to the wastes of your company	recycling	4	17,4
	incineration-landfill	14	60,9
	storage	1	4,3
	other	4	17,4
	Total	23	100,0
had your industrial unit a recovery facility or treatment?	yes	11	47,8
	no	12	52,2
	Total	23	100,0
had your establishment own or operate a center for retrieving and sorting, a center of voluntary contributions (municipal or private) where the materials have been prepared/collected for recycling?	yes	9	39,1
	no	14	60,9
	Total	23	100,0
Did your industrial establishment collect/ transport recyclable materials?	yes	7	30,4
	no	16	69,6
	Total	23	100,0

Are there procedures related to the sorting of waste in your structure?	yes	8	34,8
	no	6	26,1
	partially	9	39,1
	Total	23	100,0
Do you Do a follow-up to the cost of the management of your industrial wastes in your establishment (hardware-collection-transportation-treatment)?	yes	12	52,2
	no	9	39,1
	partially	2	8.7
	Total	23	100.0

In the industrial zone of Palma, the methods of treatment provided to industrial waste are most of the time (60,9%) by incineration or landfill, and that 52,2% of the industrial units do not possess waste recovery or treatment facilities, recovery and sorting centers, and voluntary contribution centers (municipal or private), where the materials must be prepared/collected for recycling.

Generally, dangerous medical products, ashes, unburnt, and other wastes that belong to the category of hazardous waste and that includes the criteria (of flammability, the causticity, the explosiveness, and toxicity) are handled in several ways. The incineration of industrial wastes at the level of the industrial zone "Palma" is done on large quantities and may contribute to the

CO2 emissions due to incineration. While composting or other forms of biological treatment are reserved for agro-food industries wastes or other pharmaceuticals waste. The State prohibits the discharge of especially hazardous wastes without that they have been pre-treated due to adverse effects that they generate on public health and the nature.

According to table 6, it is noted that most of the industrial establishments (69,6%) have fundraising activities or transportation of recyclable materials, but there are no procedures related to the sorting of the waste industry within the industrial units. 52.2% of the industrial establishments say that they perform a follow-up to the cost of the management of their industrial waste in respect of: hardware, collection, transport, and treatment.

Table 7. the importance of environmental concerns within the facilities industry

		Frequency	**Percentage**
Do you Think that your activity has an impact on the environment?	yes	16	69,6
	no	7	30,4
	Total	23	100,0
What kind of pollution you think your business generates?	air pollution	6	26,1
	water pollution	8	34,8
	lithospheric pollution	7	30,4
	other	2	8,7
	Total	23	100,0
What are the different types of taxes related to wastes your industrial establishment supports?	taxes on polluting and dangerous activities	2	8,7
	taxes on the pollution of industrial origin	5	21,7
	complementary taxes on industrial wastewater	6	26,1
	incentive taxes or elimination of industrial waste	3	13,0
	other	7	30,4
	Total	23	100,0
According to you, what should be done to reduce the impact of industrial wastes on the environment :	develop clean technologies, (that is to say, that produce less waste, more manageable	7	30,4
	treat the waste so as to render it acceptable for the environment	6	26,1
	to reduce or stop the production of the waste or products that generate waste	5	21,7
	implement a policy of recycling	2	8,7
	burying hazardous waste under conditions such that they do not pose more danger to the environment	3	13,0
	Total	23	100.0

Third part: what is the importance of environmental concerns with in industrial institutions?

69.6%of the industrial establishments claim thattheir industrial activities have an impact on thenatural and human environment, and their industrial discharges generate several types of pollution with the predominance of water pollution (34, 8%) because of the direct releases to OuedRhumel. Because of their releases, 26.1% of the industrial units support complementary taxes on industrial wastewater, and 21.7% support the tax on air pollution of industrial origin.

In order to minimize either the impact of their emissions and the natural and human industrial waste on the environment, the heads of the industrial establishments believe that the development of clean technologies can reduce the problem of industrial waste (30,4%) while 26.1% see that the treatment of waste in a manner that make them acceptable for the environment.

The Impact of Industrial Discharges of " Palma" Zone

As a result of its economic development and the increase in the number of industrial establishments, the industrial zone "Palma" is in a degraded state.This is due to the non-compliance tothe provisions relatedto the protection of the environment and the industrial wastes by the producers in addition tothe failure to take into account studies of the impacts on the environment of the industrial establishments,which involved plenty of the complication of this issue. These impactscan be harmful on ashort or long term on the differentcomponents of the environment, human health, and urban development throughout the city in general.

- ✓ Each year, millions of tons of wastes and industrial residues commonly used in the industry are rejected in"OuedRhumel".Despite their treatment of certain type of wastes, the accumulation of toxic elements (solvents, chemicals products), biodegradable waste,and the contamination thatis due to this issue can become adirect and dangerous source of water pollution.
- ✓ The soil in the industrial zone Palma, and everything that it encompasses, is severely influenced by the depositand the rejection of some of the industry waste, it is exposed according the following elements: -Chemical pollution due to the chemicals elements released by the industries;

  -the poverty of the soil due to themultiple erosions;

  - Soil contamination due to hazardous waste landfilled.
- ✓ Concerning air pollution, and during the phase of industrial waste treatment, a wide variety of releases and dangerous elementsare meld, which causes thegaseousemanations fullof high amounts of methane,greenhouse gas (CO2,Ch4, N2O, and CFCS), smoke anddust.Sometimes, these gases are released into the air by the waste processing facilities at the level of each establishment.
- ✓ The impact of generated industrial waste can also touch the health ofwaste collection and treatmentfacilities workers within the industrialestablishments, although it exists only few data about this point.

CONCLUSION

Today, waste industry is very complicated;it requires a good knowledge in order not to repeat the mistakes of the pastin order not tobe one of the main sources of pollution.The new classifications have helped structure this industrial theme and allowing us to clarify the concepts of releases: liquid, solid and gaseous,etc.The industry inConstantine, as a result of its location integrated into the urban space (7 industrial zones);especially at the level of the industrial zone "Palma", the nature of the industrial activities and the non-treatedwaste released into the environment contribute as a key role in the degradation of the urban environment.

The most polluting industrial units are undeniably those of dairy products and of drugs which discharge a portion of industrial wastewater, which are derived from the manufacturing process directly in the natural environment (OuedRhumel), while the majority of these waters are now treatedby the wastewater treatment plants. Adding to this, these units areresponsibleof a largepart of air pollution because it issues each day different quantities of gaseous discharges directly inthe atmosphere. This is in addition to the solid waste of all kinds that are stored and disposed without any necessary steps leading to harmful effects on the environment and health.

The production of industrial waste differsdepending on the importance of the activity sectors of one country to another. Agood management of industrial isenables us to consider the environmental impact of thewastes and systematize the recycling of certain types.The only solution is to integrate environmental concerns in the initial objectives of each industrialunit in order to reconcile theindustry and the environment.To overcome these problems and to achieve this goal, several proposals are possible:

- The establishment of a collective waste management and working in partnership ofcertain industrial establishments according to their sector of activity,geographical area, etc.to collectively manage their industrial waste that requires a particular treatment, and more or less expensive as hazardous waste;
- The introduction of an analysis of the product life cyclethat enables evaluatingits globalimpact on the environment by taking into consideration all stages of its life cycle: raw material extraction, production,manufacture, distribution, use, end-of-life (recycling, incineration, etc)in order to solveall environmental problems which the industrial establishment of zone Palma faces;
- To providefinancial aid for industries and establishments with the aim to improve the management and treatment of their industrial waste, and this can be through public or private stakeholders;
- The implementation of clean andmore respectful to the environment technologies inthe reductionofan amount of produced wastes and sources of pollution while remaining economically competitive. These practices pose a clear advantage for the environment with the manufacture's products cleaner.Three levels of intervention can be put in place: the optimization of an existing process (loss limitation, raw materials, sorting etc.), the modification of an existing unit, complete change of the process of fabrication;
- Integration of renewable energy (solar thermal or photovoltaic, heat production from biomass, ...)in the evolution of industrial processes in order to reduce thesegreenhouse gas emissions (GHG) and the carbon footprint of the industrieswithin the industrial zone of Palma.

REFERENCES

1. «ANGED», L'agence nationale de gestion des déchets. «Rapport sur la gestion des déchets solides en Algérie.» Avril 2014.
2. (FNADE), Fédération national des activités de la dépollution et de l'environnement. Valorisation organique. 2015. https://www.fnade.org/fr/produire-matieres-energie/valorisation-organique (accès le 03 24, 2022).
3. Bovea. M. D, Ibáñez-Forés. V, Gallardo. A, Colomer-Mendoza. «Environmental assessment of alternative municipal solid waste management strategies. A Spanish case study.» Waste Management 30 (11 2010).
4. Centre d'étude et de réalisation en urbanisme, Constantine. «cahier de cherge de la zone d'activité Rhumel et la zone industrielle Palma.» Article 24: protection de l'environnement. p22.
5. Damien, Alain. Guide de traitement des déchets. Édité par 3 éme édition. paris: Dunod, 2004.
6. écologique, Ministére de la transition. «Déchets dangereux.» France, 24 février 2022.
7. environnement, France. Recyclage de DIB déchets industriels banals. https://www.franceenvironnement.com/sous-rubrique/recyclage-de-dechets-industriels-banals--dib- (accès le 09 01, 2021).
8. Guittonneau, Sébastien. «Procédure de gestion des déchets industriels.» LOUDEAC, environnement, France.
9. Jean-Michel, Ballet. Aide mémoire de gestion des déchets. Paris: Dunod, 2011.
10. Julia, Vorburger. «Ecologie industrielle et valorisation des déchets.» rapport de stage, Faculté de sciences et de l'administration, 2006.
11. Khouildi Sayeh, Hamdi Meftah. «La gestion des déchets industriels: étude de cas Flash chemicals industry (FCI).» Université Kasdi Merbah, 2016.
12. «Loi n°83-03 du 5 février 1983 relative à la protection de l'environnement, article 89.»

13. Mayar, Nathalie. «Futura Planéte.» Déchet industriel banal: qu'est-ce que c'est? https://www.futura-sciences.com/planete/definitions/developpement-durable-dechet-industriel-banal-16953/ (accès le 07 13, 2021).

14. PAPREC. La valorisation organique: un retour à la terre. https://www.paprec.com/fr/comprendre-le-recyclage/seconde-vie/les-differentes-filieres-pour-vos-dechets/valorisation-organique/ (accès le 03 24, 2022).

15. Tanguy, Audrey. «Approche territoriale de la valorisation des déchets: élaboration d'un modéle pour la conception de fliéres adaptées au territoire.» Université de Québec, aout 2017.

Citation: *KABOUCHE LINA, KHALFALLAH BOUDJEMAA, et al. Industrial Waste - Case of the Industrial Zone "Palma" -Constantine City-. Int J Innov Stud Sociol Humanities. 2022;7(6):158-169. DOI: https://doi.org/10.20431/2456-4931.0706015.*