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## IMPACT OF INDUSTRIAL ACTIVITIES ON THE ENVIRONMENT. CASE STUDY: ALEMO COMPANY, ALGERIA

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**Abstract:** *The national industrial park of Algeria is mostly old, therefore polluting, this aspect leading to the appearance of serious deficiencies related to environmental protection. Moreover, awareness and information on environmental concerns are very limited, the regulatory mechanisms are fragmented, the environmental safety culture is disparate and the means of control and surveillance are often unknown. As a result, some companies faced with this problem must demonstrate sound management of the impact of their activities on the environment. The purpose of this paper is to assess the impact of the various industrial activities of an Algerian company engaged in an approach to sustainable environmental protection, based on well-defined criteria: nature, type, intensity, extent, duration, and degree of disturbance. The obtained results will be used in the elaboration of an action plan for the prevention and reduction of pollution, in order to develop a culture of prevention in organizations.*

**Key words:** *List Impact; Industrial activities; nuisances; environment; awareness; pollutant; health and safety at work; culture of prevention;*

### 1. INTRODUCTION

Generally, the industrial sectors bring many economic and social benefits; they produce goods and products and generate jobs and tax revenues. However, the majority of industrial sites have a considerable environmental impact by the simple exercise of its activity, produces an impact on its natural and human environment. As a result, the environment in which humanity evolves is subject to disturbances of anthropogenic or natural origins, occurring on very variable time and space scales and which can lead to significant imbalances in the biosphere and to catastrophic, lethal or incapacitating developments for populations, or simply costly in terms of material goods.

They also have a significant impact on the environment by polluting water and soil, producing waste and consuming energy.

Thus, the harmful effects of this pollution represent a source of threat and pollution on human health and the environment [1,2,3,4].

Nowadays, industrial pollution is the best known and most dangerous of all forms of pollution. This pollution intensifies over the years, as the interests of companies, in particular private ones, do not align with environmental priorities. The latter is mostly underestimated and neglected in their action plans. Moreover, the severe effects of certain chemicals and other substances on safety and health now constitute an early warning system of potential consequences for the environment, and this goes well beyond the workplace [5, 6, 7].

Now the workplace and the environment, in general, are two sides of the same coin, says the International Labour Organization (ILO). In order to prevent further deterioration of the different systems on which the health of the planet depends on, the protection of the environment is imperative for the whole world [8]. All countries have to be involved in this endeavour. Protection of the environment remains a central element of the philosophy of ISO 14001 [9], as does the duty for any

organization to commit to adopting proactive measures to protect the environment from harm and degradation [10,11]. The latter protection may include issues such as the sustainable use of resources, green management, the protection of biodiversity and local ecosystems or the adoption of measures to prevent pollution [12]. It is giving a new face to the company imbued with sense and common sense, its desire to be more sustainable, its quest for new management models that are more respectful of the earth and people.

Therefore, we must raise awareness and implement daily actions to reduce, limit pollution, save resources ... in order to preserve and maintain life on earth. The change requires a political will, a strong implication of companies, public authorities, of all citizens, an evolution of mentalities and changes in the behaviour of all: to engage in a culture of prevention [4].

The latter defined in 2006 by the ILO as "the culture of national prevention in safety and health refers to a culture where the right to a safe and healthy working environment is respected at all levels, where the government, employers and workers actively seek to ensure a safe and healthy working environment through a system of defined rights, responsibilities and obligations and where prevention is given the highest priority" [13,14,15,5].

This management calls for the control of environmental impacts [16,17]. So if the company wants to move forward, it can no longer do so against its employees and the environment. It must take better management of its activities, the objective of our study. The latter must be at the heart of the environmental management system, and the company must identify the environmental aspects of its activities, products and services.

## 2. DESCRIPTION OF THE STUDY AREA

The Alemo Company (Algerian company for equipment and machinery) is a public company with a status of a shared company. Its social capital is divided into shares belonging to the mother company PMO. PMO is

specialized in manufacturing and commercializing CNC, sub-contracting and machinery maintenance. The Alemo Company is ISO 9001 Version 2000 certified since 2006, the company is thus operated under strict quality management rules. The company is located in Oued Hamimime industrial conglomerate 15 km far from Constantine one of the major cities in the eastern part of Algeria Figure.1, 2.

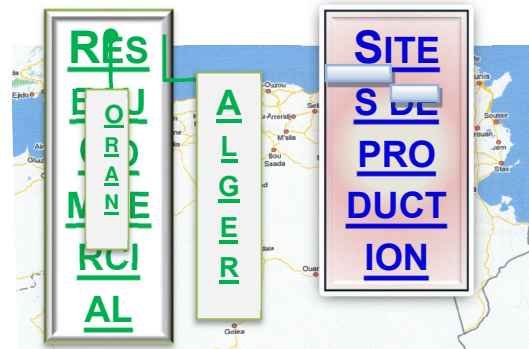


Fig. 1. Geographical location of the study



Fig. 2. Production facility at oued Hamimime El- khroub

Through this work, we are trying to identify the different sources of a nuisance for the possible development of a prevention policy that meets a balance between industrial expectations and environmental imperatives. In terms of health and safety at work we build-up on the principle of sustainable development.

The approach as such is a critical and useful approach to balance the environment and economic growth [18, 19]. It is the win-win principle to prophesy a sustainable development in health and safety at work. Everyone is winning humans, businesses and

the environment while continuously improving the dysfunctions that arise, Figure 3. Everyone is winning humans, businesses

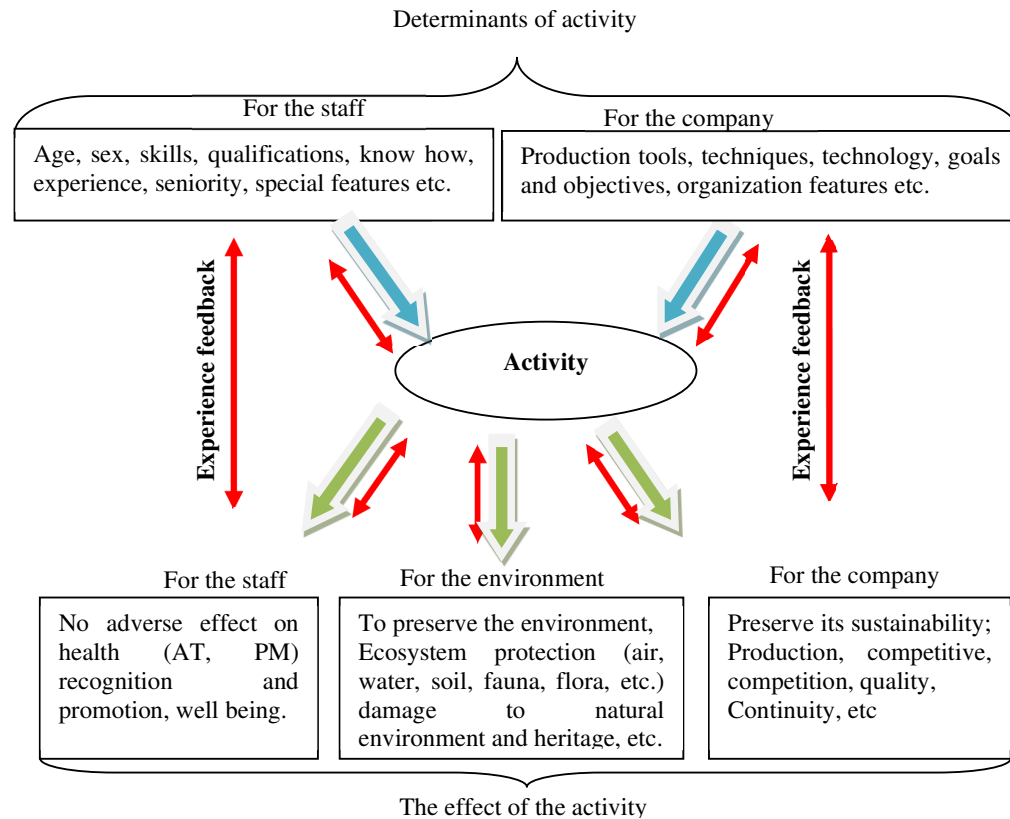


Fig. 3. Activity sustainable development slogan win-win [18].

### 3. MATERIALS AND METHODS

The nature of the activities of many companies can now be a source of pollution or damage to biodiversity at any time. Thus, according to the authors, it will therefore be spoken of environmental risks or ecological risks, sometimes to designate the risks generated by human activity on the environment [20] and sometimes to qualify the "risks weighing on life, human, health and economic activity due to the degradation inflicted on the functional, production and assimilation capacities of ecological systems" [20]. The objective of this study is to assess the damage generated by the industrial activities of an Algerian company impacting the environment (water, air, soil) in order to confront a reflection on environmental concerns.

Thus, manage to identify the various sources of pollution and nuisances of the operation of the installations on the

environment, to determine the malfunctions of specific installations in order to develop measures, procedures and devices to prevent, reduce, and/or eliminate pollution and nuisances or even engage in a culture of prevention. The latter allows us to prevent, manage and reduce the production of the harmfulness of waste without endangering or altering human health and without harming the environment, in particular without creating any risk for the ecosystem, fauna and flora while ensuring public information on the effects on the environment and public health of waste production and management operations [15, 8].

To carry out this work, a risk management framework was used Fig. 2. It is an essential tool for integrating risk management into all functions processes and projects.

As fields of application, we have chosen an Algerian company whose activities are considered to be a source that can lead to

changes in one or more sensitive environmental components.

The environmental aspects are identified by thoroughly analyzing the interactions between the industrial activities and the different environmental components. The industrial activities are considered potential sources of alteration of the most sensitive environmental components.

Potential interactions are byproducts to the internal operation of the different equipment and machinery as used in the industrial activities.

The byproducts can be as diverse as air/ liquid emissions, waste and hazardous material management, noise and machinery maintenance work [21].

The methodology for evaluating the impact is based on putting focus on the value of the different environmental components Table 1.

**Table 1. Assessment matrix of environmental aspects impact**




Aspect							Frequency			
Degree	Resource consumption	Nuisance	Pollution			Waste	insignificant	Low	medium	high
	natural (CW, CE, CC, MP)	Noise (NB)	Air (EA)	Ground (ES)	Water (EE)	Waste (DMA, DS, DSD)	F1	F2	F3	F4
	D1	<5% of overall consumption	Noise level acceptable and intermittent	Low intermittent and harmless release	Spill of small quantities of biodegradable substances	Discharge of water in the same state as at the origin (watering or other)	Selective sorting (for treatment or recycling) of household waste	E4	E4	E4
D2	5 to 20% of overall consumption	Acceptable noise level, but frequent	Frequent rejection, but not very harmful	Spill in measurable quantities of biodegradable substances	Discharge of wastewater (sanitary or domestic) channeled to a fenced pit	Special waste is collected and taken care of	E4	E3	E3	E2
D3	20 to 50% of overall consumption	Noise level bearable, but close to the tolerated limits	Intermittent but harmful low release	Spill of small quantities of non-biodegradable substances (chemical and other)	Discharge of slightly polluted wastewater (oil, solvent, etc.) channeled to a fenced pit	Special hazardous waste is collected and taken care of	E4	E3	E2	E1
D4	> 50% of overall consumption	Noise level higher than tolerated limits and frequent	Frequent and harmful rejection	Spill of large quantities of non-biodegradable substances (chemical and other)	Discharge of polluted wastewater (oil, solvent, etc.)	Waste sorting (DMA, DS and DSD) is not carried out and / or their handling is not ensured	E3	E2	E1	E1

This evaluation is then based on different criteria such that the nature, type, intensity, extent, duration and perturbation level.

The apprehended effects of the impacts

operation and in degraded operation, will be treated as a priority according to their severity: insignificant, Low, Medium and High.

**Table 2. Appreciation of the value of the environmental components**

<i>Significant</i>	<i>Priority 1</i>		<i>Area of aspects with a significant environmental impact <b>Dangerous</b></i>
<i>Not very significant</i>	<i>Priority 2</i>		<i>Zone of aspects with little environmental impact <b>Tolerable</b></i>
<i>Not significant</i>	<i>Priority 4</i>		<i>Area of aspects Not significant, <b>Acceptable</b></i>

In this study we interest on various circles (physical appearance, hybrid, quality of grounds and biological environment).

**Physical medium:** The surrounding physical medium can have an influence on the company infrastructure, natural disaster such as flooding, earthquakes are the main concerns. The physical medium is described in the perspective of the effect it has on and under go from the company infrastructure. The main component of the medium is the air quality.

**Hybrid medium:** There are within the infrastructure sources of direct liquid pollution that modifies or alters of the water quality. The site is equipped to collect and purify wastewater. In case of leakage, the hybrid medium is impacted.

**Biological medium:** The analysis of the environmental effects on the biological medium consists in identifying the possible impact on the vegetation both inland and aquatic. In normal operating conditions, the activity does not affect the inland vegetation, when potential aspects of the activity of an environmental component are identified, the importance of predictable changes in this component is evaluated; this evaluation is based on defined criteria such as nature, type, Perturbation level, intensity, duration. The possible effects of impacts on these components will be either significant or non-significant and in some cases low significant.

#### 4. RESULTS AND DISCUSSION

Table 3, 4, 5, 6, and 7 summarize the impact assessment in two different situations (Normal conditions and anormal conditions)

**Table 3. Description of variables Impact on the air quality**

<i>Criteria (Evaluation impact)</i>	<i>Normal conditions</i>	<i>Impact</i>	<i>Anormal conditions (important toxic matter leakage and spill)</i>	<i>Impact</i>
<i>Nature</i>	<i>Effect on air quality</i>		<i>Effect on air quality</i>	
<i>Type</i>	<i>Direct Impact</i>		<i>Direct impact</i>	
<i>Perturbation level</i>	<i>Low perturbation of the media</i>		<i>Low perturbation of the media</i>	
<i>Extent</i>	.....		.....	
<i>Intensity</i>	<i>Low</i>		<i>Low</i>	

<i>Persistence</i>	<i>None</i>		<i>None</i>	
<i>Importance</i>	<i>Non-significant</i>		<i>Non-significant</i>	
<i>Duration</i>	<i>.....</i>		<i>.....</i>	

**Table 4. Description of variables Impact on the hybrid media**

<i>Criteria (Evaluation impact)</i>	<i>Normal conditions</i>	<i>Impact</i>	<i>Anormal conditions (important toxic matter leakage and spill)</i>	<i>Impact</i>
<i>Nature</i>	<i>Effect on water quality</i>		<i>Effect on water quality</i>	
<i>Type</i>	<i>Direct impact</i>		<i>Direct impact</i>	
<i>Perturbation level</i>	<i>Low perturbation</i>		<i>Low</i>	
<i>Extent</i>	<i>.....</i>		<i>Point wise</i>	
<i>Intensity</i>	<i>Zero</i>		<i>Low</i>	
<i>Persistence</i>	<i>Non</i>		<i>Low</i>	
<i>Importance</i>	<i>Non-significant</i>		<i>Non-significant</i>	
<i>Duration</i>	<i>.....</i>		<i>short</i>	

**Table 5. Description of variables Impact on the ground quality**

<i>Criteria (Evaluation impact)</i>	<i>Normal conditions</i>	<i>Impact</i>	<i>Anormal conditions (important toxic matter leakage and spill)</i>	<i>Impact</i>
<i>Nature</i>	<i>Effect on the ground quality</i>		<i>Effect on the ground quality</i>	
<i>Type</i>	<i>Direct impact</i>		<i>Direct impact</i>	
<i>Perturbation level</i>	<i>Low</i>		<i>Low</i>	
<i>Extent</i>	<i>.....</i>		<i>None</i>	
<i>Intensity</i>	<i>Low</i>		<i>Low</i>	
<i>Persistence</i>	<i>Low</i>		<i>Low</i>	
<i>Importance</i>	<i>Non-significant</i>		<i>Non-significant</i>	
<i>Duration</i>	<i>.....</i>		<i>Short</i>	

**Table 6. Description of variables Impact on the biological media**

<i>Criteria (Evaluation impact)</i>	<i>Normal conditions</i>	<i>Impact</i>	<i>Anormal conditions (important toxic matter leakage and spill)</i>	<i>Impact</i>
<i>Nature</i>	<i>Effect on wildlife quality</i>		<i>Effect on wildlife quality</i>	
<i>Type</i>	<i>Direct-indirect impact</i>		<i>Direct-indirect impact</i>	
<i>Perturbation level</i>	<i>Low perturbation of the media</i>		<i>Mid to high</i>	
<i>Extent</i>	<i>.....</i>		<i>Local</i>	
<i>Intensity</i>	<i>Low</i>		<i>High</i>	
<i>Persistence</i>	<i>None</i>		<i>Mid to high</i>	
<i>Importance</i>	<i>Non-significant</i>		<i>Significant</i>	
<i>Duration</i>	<i>.....</i>		<i>Mid</i>	

**Table 7. Description of variables Impact on the human media**

<i>Criteria (Evaluation impact)</i>	<i>Normal conditions</i>	<i>Impact</i>	<i>Anormal conditions (important toxic matter leakage and spill)</i>	<i>Impact</i>
<i>Nature</i>	<i>Effect on the human media</i>		<i>Effect on the human media</i>	
<i>Type</i>	<i>None</i>		<i>Direct-indirect impact</i>	
<i>Perturbation level</i>	<i>Zero</i>		<i>Low</i>	
<i>Extent</i>	<i>.....</i>		<i>Local</i>	
<i>Intensity</i>	<i>Low</i>		<i>Low</i>	
<i>Persistence</i>	<i>None</i>		<i>Low</i>	
<i>Importance</i>	<i>Non-significant</i>		<i>Low-significant</i>	
<i>Duration</i>	<i>.....</i>		<i>Short</i>	

The results of evaluation are grouped in the Table 8.

**Table 8. Description of variables Impact on the human media**

<i>Environmental component</i>	<i>Impact evaluation</i>	
	<i>Normal conditions</i>	<i>Anormal conditions (important toxic matter leakage and spill)</i>
<i>Physical media</i> <i>1/Air quality</i> <i>2/Hybrid media</i>	<i>Non-significant impact</i>	<i>Significant impact</i>

3/Ground quality		
Biological media 1/Fauna 2/Vegetation	Non-significant impact	Significant impact
Human media 1/ Public infrastructure 2/ Quality of life 3/ Health and security at work	Non-significant impact	Low-Significant impact

The diagnosis of the various installations and infrastructures installed visual controls as well as the results of the analyses and the measurements carried out, show that during its activities the ALEMO Company cannot pollute the receiving environment.

It should be noted, however, that the main expected impact of the company's industrial activities on the external environment is the risk of accidental release of toxic substances or a significant leak due to technical or other failures.

The impacts of an accidental spill may relate to the following different susceptible receptor media; the physical environment, the hybrid environment and the biological environment.

**5 CONCLUSIONS**

It is clearly fundamental that the protection of the environment remains a central and military element of any organization.

As a result, any organization must commit to proactive measures to preserve the environment from harm and degradation. For that, it requires a political will, strategies, innovation and resources to alter this trend. From now on, there can be no industrial development without a protection of the real environment.

For the time being the company's environmental policy is not explicitly written but a real desire to improve performance must be displayed.

Therefore, the company must focus its governance policy on all environmental issues related to its operations, such as air pollution, water and wastewater management, waste management, ground contamination, etc., or even use an ISO14001 management system for example.

Thus, be part of a dynamic of continuous improvement of the systems in order to improve its environmental performance, as a result, prevention is required for accidental spills.

The following practices are recommended:

- ✓ Strengthen preventive information, awareness-raising, environmental education and participation in environmental protection measures.
- ✓ Report any form of malfunction of the production tool that can cause nuisance or pollution to the environment.
- ✓ Have a qualified maintenance service and adequate maintenance and monitoring tools for the technology used.

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## **IMPACTUL ACTIVITĂȚILOR INDUSTRIALE ASUPRA MEDIULUI. STUDIU DE CAZ: FIRMA ALEMO, ALGERIA**

**Rezumat:** Parcul industrial național al Algeriei este în mare parte învechit, deci poluant, acest aspect conducând la apariția unor deficiențe grave legate de protecția mediului. Mai mult, conștientizarea și informarea cu privire la problemele de mediu sunt foarte limitate, mecanismele de reglementare sunt fragmentate, cultura siguranței mediului este dispartă, iar mijloacele de control și de supraveghere sunt adesea necunoscute. Drept rezultat, unele companii care se confruntă cu această problemă trebuie să demonstreze un management solid al impactului activităților lor asupra mediului. Scopul acestei lucrări constă în evaluarea impactului diferitelor activități industriale ale unei companii algeriene angajate într-un demers de protecție durabilă a mediului, pe baza unor criterii bine definite: natura, tipul, intensitatea, întinderea, durata și gradul de perturbare. Rezultatele obținute vor fi utilizate în elaborarea unui plan de acțiune pentru prevenirea și reducerea poluării, în vederea dezvoltării unei culturi a prevenției în organizații.

**Cuvinte cheie:** Impactul listei; Activități industriale; pacoste; mediu inconjurator; conștientizare; poluant; sănătate și siguranță la locul de muncă; cultura prevenirii;

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