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WASTE RECOVERY IN ALGERIA BETWEEN A ROCK AND A RESCUE

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ABSTRACT

Since the year 2000, Algeria has been committed to improving the quality of the environment and enhancing the quality of life for its citizens. Efforts have been made to achieve efficient, integrated waste management. The fact is that we are facing a major shock, and for some years now, the state has been showing shortcomings in the field, which demonstrates that the resources deployed need to be strengthened and consolidated. To cushion this shock, we need to come to the rescue with solutions and proposals. This work aims to propose efficient solutions that involve users in waste collection and sorting. To achieve this, we first need to understand the behavior of users by measuring the waste generated and collected, because the majority of citizens want to sort waste, but in reality, this is still not respected.

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Introduction.

Algeria has complied with several international agreements and protocols relating to the environment and sustainable development. Since the early 2000s, the country has adopted a new environmental protection policy through the implementation of the National Environmental Strategy (SNE). Integrated waste management has become one of the Algerian government's priorities. The first law relating to waste management was passed on 12 December 2001: "law n°01-19".

This establishes a reference framework for the management, control, and elimination of waste. It is based on widely accepted principles, namely prevention, and precaution to minimize waste at source, the polluter pays principle, the concept of producers of recycled waste, and the right of citizens to be informed about risks and their impact on health and the environment. This law is the starting point for the implementation of the program of activities relating to domestic and similar waste (DMA) known as the National Programme for the Integrated Management of Domestic and Similar Waste (PROGDEM).

In addition, the financial framework for managing eco-taxes in general and taxes related to household waste management in particular has been enacted. However, financial resources for waste management still depend on the State budget, mainly through decentralized¹ programs (for the wilayas² and communes) to the tune of 95.5% (MEER, 2018a), but also through various funds, local authorities, and foreign capital.

Expenditure on waste management over the period 2002-2016 rose from 0.06% of GDP in 2002 to 0.03% of GDP³ in 2016, which is still less than the expenditure needed to reduce the costs of environmental degradation due to waste emissions and has risen continuously from 0.32% in 1999 to 0.76% of GDP in 2015 (MEER, 2018a) (Tahar TOLBA et al, 2020).

Observations by the media, associations, and citizens all point to dissatisfaction with household waste management. This finding was confirmed when the National Strategy for Integrated Waste Management to 2035 (SNGID-2035) was drawn up (MEER, 2018b) (Tahar TOLBA et al, 2020).

I.1 Waste Management in Algeria.

Until the end of 2001, a single legal framework governed waste management in Algeria: decree no. 84-378 of 15 December 1984, setting the conditions for the cleaning, disposal, and treatment of solid waste in urban areas, an application document for law 83-03 of 5 February 1983 on environmental protection. Algeria, by ratifying Presidential Decree No. 98-158 of 16 May 1998 (Tahar TOLBA et al, 2020).

The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal imposes obligations on waste legislation. With the creation of the Ministry of the Environment in 2000, the first law adopted concerning waste management, control, and disposal was promulgated on 12 December 2001. This law is considered and constitutes the basis of the legal system governing waste management. Law 01-19 also defines the concept of waste and its identification, the different types of waste, and the terms associated with waste management, such as generators, storage, collection, classification, treatment, etc. (Article 3) (Tahar TOLBA et al, 2020).

At the institutional level, in addition to the central structures of the Ministry of the Environment and Renewable Energies (MEER), the Ministry of the Interior and Local Authorities and Town and Country Planning (MICLAT) is competing to implement the new policy Creation of a national household waste management policy National Waste Agency (AND) and National Conservatory of Music Environmental Training (CNFE) 2002 reinforces the system of household waste management activities in Algeria (Figure 1).

¹ A portion of the State budget is allocated to local authorities (wilayas and communes), for which the authorizing officer is the wali (equivalent to the provincial governor in Belgium) or the president of the communal people's assembly (equivalent to the mayor in Belgium).

² The wilaya is a local branch of the state, the equivalent of a province in Belgium. Algeria has 48 wilayas.

³ What appears to be a drop is linked to an increase of around 280% in GDP between 2002 and 2016. Algeria's GDP rose from USD 56.76 billion in 2002 to USD 159 billion in 2016 (source: World Bank), and the substantial sums earmarked for waste management have risen sharply, from USD 34.056 million in 2002 to USD 47.7 million in 2016, but remain below the cost of environmental degradation due to waste over the same period.

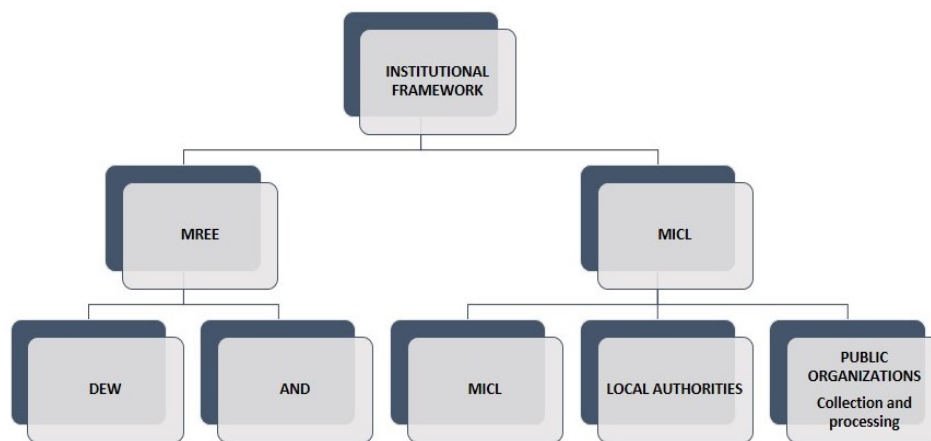


Figure 1. Institutional framework for waste management in Algeria.

Source: La gestion des déchets en Algérie Enjeux et perspectives Karim Ouamane, DG AND Brussels, 07 March 2017. Realised by author.

I. 2. The National Programme for the Integrated Management of Municipal Waste (PROGDEM).

Through the National Programme for the Integrated Management of Household and Assimilated Waste (PROGDEM), Algeria's strategy for the integrated management of household and assimilated waste (Figure 2) is primarily based on considerations of public hygiene and the protection of citizens' health (BERTOLINI, 2005).

In Algeria, household and similar waste is waste from households, small shops, markets, restaurants, administrations, and industrial facilities. The quantity of waste produced can be expressed in terms of mass or volume. However, because of its compressibility, only mass is a reliable indicator that can be easily measured using a weighbridge. The quantities produced are therefore expressed in Kg/inhabitant/day or per year (Tahar TOLBA et al, 2020) (AND, 2020).

The program in question consists mainly of :

- Drawing up master plans,
- Building and equipping landfill sites,
- Eradicating illegal dumps and rehabilitating sites,
- Setting up selective sorting systems.

Its objectives are to

- Integrated planning of municipal waste management,
- Improving and professionalizing management capacities.

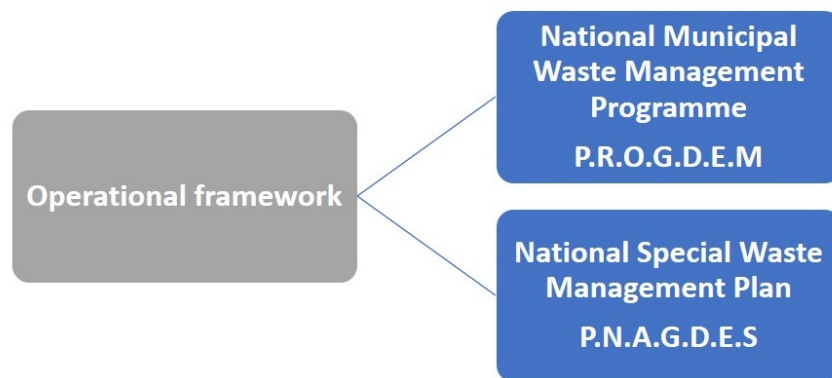


Figure 2. Operational framework for waste management in Algeria.

Source: La gestion des déchets en Algérie Enjeux et perspectives Karim Ouamane, DG AND Brussels, 07 March 2017. Realised by the author.

I.3 Main achievements since the launch of PROGDEM.

- Eradication of illegal dumps (2000).
- Treatment facilities.
- 163 landfill facilities for hazardous waste .
- 54 DI storage facilities.
- 18 sorting centres.
- 26 waste collection centers.
- Planning tools.
- 1223 masters plans out of 1541.

II - Methods and Materials.

This study partly uses the results of the research of the DETRITUS project, a study carried out in 2012 on waste management and selective sorting in HLM collective housing which revealed interesting results, we will base ourselves on these to try to see if this method can be effective for the case of the management of DMA waste in Algeria or not? The management of this waste includes collection, transport, sorting, recovery, and/or disposal (N. BOYER et al, 2018).

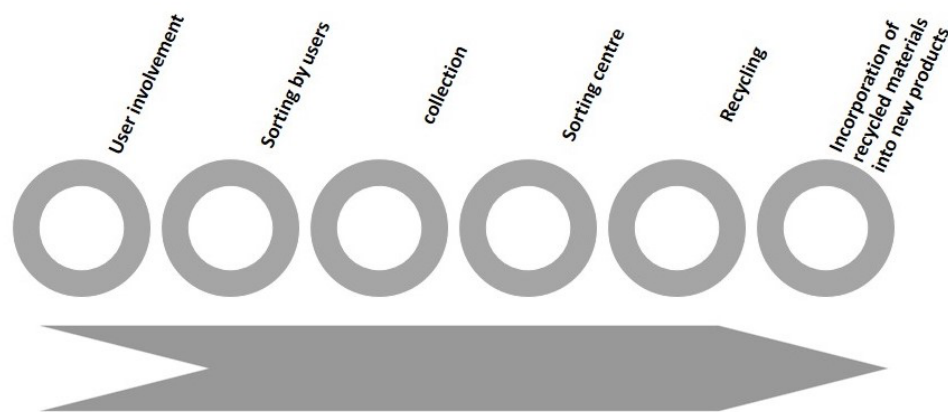


Figure 3. The waste management cycle.

Source: Guide: How to better collect and manage waste in establishments open to the public (ERP). September 2018.

The methodology in question consists of carrying out an inventory by measuring the waste generated and collected (N. BOYER et al, 2018) To understand user behavior, it is recommended to qualify and quantify the sorting carried out. An inventory is a prerequisite for implementing an action plan with technical solutions, communication, and awareness-raising activities aimed at internal or external users. This diagnosis involves determining the characteristics of the waste:

- What is the source of the waste (quantity and type of waste)?
- How much waste is generated per type of waste and year (in tonnes, kg, or liters if you use wheeled bins)?
- By consignment, which containers are used for pre-collection on site (wheeled bins, office bins, etc.) and storage for transport (wheeled bins, skips, compactors, etc.)?
- How often is each depot collected?
- What are the cost items (rental of storage equipment + collection + processing - acquisition of equipment) for each depot? It would be useful to supplement these measurements with:
 - Surveying stakeholders (customers, franchisees, waste management service providers, etc.) to find out about their practices;
 - Auditing practices to check regulatory compliance and taking the necessary measures to ensure compliance;
 - The teams work to find technical and organizational solutions (type of container, frequency of collection, etc.) and incorporate certain requirements into service provider/retailer/purchaser specifications, etc.
 - Ensure understanding and consensus among all the stakeholders involved in the system. The initial qualitative and quantitative diagnosis aims to take account of the entire chain to improve sorting performance, harmonize waste management, identify potential savings, and monitor the progress of sorting (Reporting and evaluation of actions) (N. BOYER et al, 2018).

III-Results and Discussion.

The study notes that there are four types of user profiles (which must of course be qualified) (N. BOYER et al, 2018):

- "Good sorters": aware of the environment, no specific action is required as these elements are well integrated;
- "I would like to sort but I can't" Without specific awareness, individuals consider waste classification as an obstacle or even a mental burden. It's difficult to understand;
- Individuals do not understand its positive impact": waste is seen as dirty and polluting, but there is a lack of awareness of the impact that sorting can have. Signage not included;
- I don't sort, it doesn't interest me": these are often young people who work but don't earn much and who are not very aware or sensitive to the act of sorting and its importance. We must therefore continue to raise their awareness, as they live in a world full of constraints (in particular, they are very concerned about money) and the environment is not their absolute priority. Furthermore, the behavior involved in sorting is a constant "bricolage" (there are no linear practices because they are not institutionalized): sometimes individuals do not know how to sort a specific type of waste (N. BOYER et al, 2018).

III.1 The limitations and obstacles analysed during this research according to (N. BOYER et al, 2018) are:

-Technical: inaccessible container, dangerous access, too far away, space too small to accommodate the container, lid too heavy, hatch too small, etc.

- **Hygiene:** awareness of dirt in containers, sacks or boxes;
- Because of the wide variety of containers and lockers, managing the classification becomes complex for individuals.

- Culture and ethnicity: clearer classification of certain professions and social groups.

- Because of the disparities between men and women (the proportion of waste "dedicated" to women in general) and generational influences (the main role of children in changing behavior).

- Sensitivity varies from one individual to another.

- Space-time concept: if users are in a hurry, they can throw their rubbish on the ground or into the first bin they see, regardless of their "environmental conscience". On the other hand, if they had more time, they would be able to take a more considered approach, in particular by reading the instructions. To understand users properly, companies need to analyze user characteristics and expressions. To do this, they need to combine socio-demographic criteria (gender, age, socio-professional type, etc.) with psychosocial factors (emotions, cognition, and personal and social expression). The aim is to provide a systematic vision with specific communications to support individuals. The act of sorting is both 'the end of waste' for consumers and the start of the recycling chain. However, waste is not taken into account at the time of purchase (consumers do not imagine that they will throw away the packaging when they buy a product). So it's important to explain to them what happens to the waste after they've sorted it, to give it meaning (what is it used for? does it end up at the end of the chain ? etc.).

We also need to explain and tell the story in the form of a story so that the children can project themselves, change their behavior, and find other forms of "dialogue" than the teachings and constraints in arranged gestures, or at least find an explanation. Overcome these limitations gently. Placing attachments can also help to improve sorting behavior. There is little sociological research on the behavior of users about waste management, but some lessons can be learned from more general projects on waste management, such as the DETRITUS project,

a study carried out in 2012 on waste management and selective sorting in low-income housing. Collective housing is carried out by ETICS and coordinated by ADEM (N. BOYER et al, 2018).

III.2 Strategies for efficient waste management according to (OUAMANE, 2017):

Establish the composition and mapping of waste to improve the sorting system.

In this case, Algeria needs to create and manage a national information system on waste management and a monitoring and warning system.

What is a WIS?

- An analysis and decision-making tool,
- A warning system.

What can be found in the NIDS?

- Map libraries,
- indicators....

Target audience?

- Local authorities (Figure 4),
- Project sponsors,
- administrations and institutions,

Evolution of the rate of connection of the population to the CET.

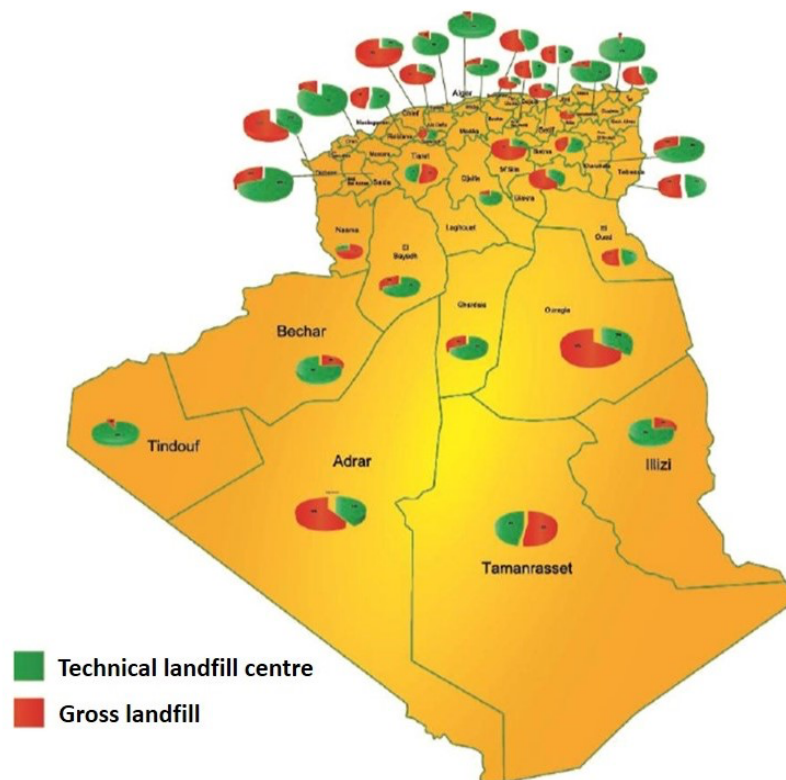


Figure 4. Distribution des centres d'enfouissement et des décharges brutes en Algérie.

Source: La gestion des déchets en Algérie Enjeux et perspectives Karim Ouamane, DG AND Brussels, 07 March 2017.

The Early Warning System (EWS).

- Toll-free number.
- Website queries.
- Connection via a VPN network with local environmental departments.

To adapt and modernize public classification systems, it is essential to know waste practices and behavior (N. BOYER et al, 2018).

Characterising different waste streams to understand their composition:

- Measuring sorting errors.
- Recycling potential of unsorted waste.
- Whether there is a hazardous or polluting waste.

Carry out cleanliness measurements to find out which areas are most exposed:

- Concentration of pedestrians.
- Peak footfall.
- Use locations according to their type: high-traffic areas, queues, etc.

Carry out behavioral measurements to check the most suitable layout:

- At the same time, check the quality of container packaging and classification.
- Check the volume and certain positions of the containers.
- Calculate the hesitation time of the public in front of posters, instructions, etc.

Knowledge of flows and uses, during the preliminary diagnostic phase and then during the "full-scale" tests of the system, is essential to involve the project leader and the target public (N. BOYER et al, 2018).

Propose effective waste management solutions linked to user behavior (N. BOYER et al, 2018):

- RULE 1- 5R

Reject: Can I get a cloth bag at home to put my shopping in?

Reduce: I can go to the library instead of buying new books.

Reuse: I can use jam jars to store small items.

Give back to the earth: I can set up a compost bin in my garden/on my balcony. Recycle: When I sort my rubbish into the right bins, I'm taking part in the recycling process.

- RULE 2- Sort your waste

Glass bin: I keep glass bottles, glass jars, glass yogurt pots, glass jam jars, etc. in the glass bin. Go there.

Bin for packaging and paper: I put plastic bottles and jars, food containers, cardboard boxes and large folding cardboard boxes, cans, aluminum trays, aerosol cans and paper, newspapers, magazines, and publications.

Food waste: I put food scraps (chicken, fish bones, mashed potatoes, bread, etc.), apple peelings, apple cores, etc. in this bin. But if I don't have a collection or composting bin at home, I put it with the household rubbish.

Household rubbish: I put dirty packaging and paper (greasy pizza boxes, paper towels, etc.), small objects that can't be reused or are too dirty (baby nappies, cotton), sticks, slippers chewed by animals, and old toothbrushes. Other items such as pens that no longer work, broken toys, broken plates, etc.)

Anything left over after the bins have been sorted can be recycled. This waste cannot be recycled!

Technology equipment bin.

This is where I put my broken computer or phone. Electronic devices contain contaminating materials that must be disposed of properly. That's why you shouldn't throw them in the bin. Equipment distributors can organize recycling collections. There is also a special collection point.

IV- Conclusion.

Like most developing countries, the waste management sector faces many social, economic, and environmental limitations.

Social aspect.

The application of management or operating methods adapted to the local context and characteristics;

- Although local associations have made little effort in terms of raising awareness, their level is considered to be below expectations, due to the low level of compliance by the population with instructions relating to the respect of collection times and points in particular. To achieve this objective, allocating the city's budget specifically to communication and awareness-raising should be one of the city's priorities (AND, 2020);

Capacity-building through external support and targeted advanced training for managers in the waste management sector at the local level (AND, 2020).

Economic aspect.

The adoption and implementation of a carefully thought-out organization will enable collection and cleaning facilities to be better optimized;

- Increase waste storage capacity to better cover the territory;
- In addition to the regular collection, the introduction of selective collection through the funding of pilot projects will be an asset in developing recovery and recycling channels for the city (AND, 2020).

Environmental aspect.

- Modernise existing facilities in terms of both physical installations and operating methods;

- We strongly encourage the creation of grant projects for the construction of other facilities, whether for household waste, similar waste, or special waste (AND, 2020).

Planning guidelines are often poorly understood by users because they have not been harmonized at the national level and are not sufficiently clear and legible for citizens. Studying users' sorting behavior and their relationship with waste to understand it can help to better identify the obstacles that limit the implementation of a good sorting action.

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