The problem of the effectiveness of public policies in household waste Management in Algeria. Study applied to PROGDEM

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Abstract:

To address household waste management (HWM), Algeria has implemented a Household and Similar Waste Management Program (PROGDEM). As part of our contribution, we intend to highlight its opportunities by presenting its various areas of focus and its ability to reduce waste quantities under conditions that guarantee environmental and public health protection. The aim will be to examine the extent to which this program has succeeded in sustainably addressing the issue of waste management. We will then attempt to outline an assessment of the areas implemented at the local level. In addition, we will attempt to demonstrate the extent to which the expected objectives have been achieved.

Keywords: Waste management; PROGDEM; performance indicators; efficiency; sustainable development.
JEL Classification Codes : D6 ; H43 ; Q58.

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1. INTRODUCTION

1.1. Context and Importance of Effective Waste Management:

The changes in production methods experienced by consumer societies expose the issue of waste management acutely. Effective management of household waste (HW) plays a key role in achieving the objectives of sustainable territorial development. The issue of HW constitutes both a challenge and an opportunity for local authorities, and occupies a very important place within them. The local public service for HWM broadly concerns the organization of all waste management activities that begin with the production of waste -resulting from daily household activities- and end with the its safe disposal -final or ordinary waste-, knowing that the latter are not harmful to the environment and human health. Local authorities have to manage this service under conditions that guarantee economic, social and environmental efficiency to promote sustainable development (SD).

HWM is a major challenge both nationally and internationally. In Algeria, like developing countries, public policies are being implemented with a view to an environmental protection strategy with a view to exploring a management method that considers waste constraints which are constantly increasing as a territorial resource. As such, the study on the National Strategy for Integrated Waste Management and Recovery by 2035 (SNGID 2035) predicts a dramatic increase in waste produced in Algeria, which will increase from 0.8 kg/inhabitant to 1.23 kg/inhabitant (SNGID).

In Algeria, the increase in the volume of HW is due in particular to both the change in consumption patterns and the rapid growth of the population, which is mainly concentrated in the north of the country. As a result, large quantities of waste, daily thrown away, invade our nature, ravines, mountains and neighborhoods, while presenting serious threats and damage to the environment and public health. They are partially collected by municipal services, the other part remains in the wild either due to a lack of infrastructure to contain and treat this waste, or to uncontrolled dumping which is mostly done in illegal dumps. This situation is also due to the lack of large-scale investment in management, knowing that the treatment and

recycling can represent significant potential investment.

Faced with this alarming situation, Algeria has placed HWM at the center of its prerogatives and concerns. The Algerian authorities ‘‘*have identified as a priority the regulatory and institutional strengthening of waste management, with a view to ensuring the effective and efficient implementation of collection and the development of residual processing and recycling capacities*.’’ (MEER, 2017, p. 13). The objective is to promote integrated HWM to contribute to the development of the green economy and the reduction of environmental pollution.

1.2. General Context of SD : The introduction of SD into local public waste management policies

Sustainable development is a comprehensive concept that seeks to reconcile economic, social, and environmental development. HWM is the keystone of this approach, as effective HWM aims to streamline natural resources while ensuring social well-being and reducing the environmental impact of human activities. Local authorities play a key role in the organization and optimal management of HW through local public waste management policies.

To this end, with a view to preserving public health and protecting the environment, the Minister of Regional Planning and the Environment (MATE) has defined a National Strategy, which resulted in the National Action Plan for the Environment and Sustainable Development (PNAE-DD). The waste management policy included in the PNAE-DD was formalized by the promulgation of Law 01-19 of December 12, 2001 relating to the management, control and disposal of waste. Regarding the waste component, the PNAE-DD was divided into two programs : the Municipal Solid Waste Management Program (PROGDEM) and the National Special Waste Management Plan (PNAGDES).

1.3. Objective of the Analysis :

For a dual concern, to manage waste and to preserve the environment and public health, PROGDEM sees itself as the starting point and the reference framework of the new policy on household and similar waste management in Algeria. It comes to strengthen the municipalities in

terms of waste management in a healthy and ecological way. Its mission is : the development of masters plans for the management of household and similar waste ; the closure and rehabilitation of illegal dumps ; the construction of Technical Landfill Centers (CET) and the acquisition of material resources. The objective of which is to eliminate HW with healthy methods for the sake of public health, environmental protection and for the sake of economic efficiency (gains) by recovering recoverable waste. To better assess PROGDEM's ability to achieve its assigned objectives, we asked ourselves the following question : ***''How effective is PROGDEM and how does it contribute to promoting efficient and environmentally friendly HWM ?''***

The objective of our analysis is to address the various aspects of the implemented local public policy on HWM. We will then attempt to assess the effectiveness of this local public policy in HWM and its contribution to achieving sustainable developpement goals (SDGs). This will demonstrate the connection between local public policy on HW and SD. We will then present the results which are obtained and conclude with the challenges encountered and opportunities for improvement to ensure a sustainable and responsible future.

2. Theoretical Framework

2.1. Conceptual and Regulatory Framework of Local Public Policy on HW in Algeria:

Local public policy refers to the measures and strategies developed by local authorities to meet the specific needs of their territory. Regarding local public policy on HWM, it aims to organize the collection, sorting, transportation, and treatment of waste generated by households. They must be integrated into local, national, and international legal frameworks, taking into account local or regional specificities.

2.1.1. State of HWM in Algeria:

The Algerian government, in an effort to reduce waste production at source, enacted Law 01-19 of December 12, 2001, which was reinforced by the PROGDEM, whose objective is to create waste collection centers nationwide. This was to ensure the sound and rational management of household and similar waste.

Waste was managed by Decree 84-378 of December 15, 1984, which sets out the conditions for the cleaning, removal, and treatment of urban solid waste. This decree has proven its limitations over time in the face of socioeconomic developments, the population's changing consumption patterns, and the evolution of cities. It has also proven obsolete in large cities. To address this shortcoming, several laws have been enacted at the legislative and regulatory level to make municipalities responsible for hygiene and waste management in the context of SD, because at the local level, the municipality is considered the basic unit closest to the citizen and their daily lives. This legal arsenal has manifested itself in the enactment of several laws that aim to reconcile the social, economic and environmental aspects, including Framework Law N° 01-19 of December 12, 2001 relating to the management, control and disposal of waste ; Law N° 01-20 of December 12, 2001 relating to regional planning in the context of SD ; Law N° 02-02 of February 5, 2002, relating to the protection and enhancement of the coastline, Law N° 03-10 of July 19, 2003, relating to environmental protection within the framework of SD. These laws have been described as ''2nd generation'' laws (CDD-19, 2011).

Law 01-19 stipulates in its Article 2 that the management, control, and treatment of waste are based on the following principles: prevention and reduction of the production and harmfulness of waste at source; organization of sorting, collection, transportation, and treatment of waste; recovery of waste through reuse, recycling, and any other action aimed at obtaining reusable materials or energy from this waste ; environmentally sound treatment of waste ; and information and awareness-raising among citizens. These measures aim to prevent, reduce or compensate for the risks presented by waste, and reduce its impacts on health and the environment. "*In order to control its environmental policy, particularly that of waste, Algeria has created specific institutions : the National Observatory for the Environment and Sustainable Development (ONEDD) ; the National Waste Agency (AND) ; the National Conservatory of Environmental Training (CNFE) in 2002"* (DJEMACI, 2018, p. 3)

2.1.2. The Systems Implemented for the Management of HW:

The PROGDEM is a program that was designed by the Ministry of Regional Planning and the Environment (MATE). It represents an integrated and gradual approach to HWM that *''is in line with the implementation of the urban environmental policy''* (AND). Its objective is the eradication of illegal dumping practices by organizing the collection, transport and disposal of waste while ensuring the protection of the environment and the preservation of public health mainly through *''the construction, development and equipment of technical landfill centers (CET) in all wilayas''* (AND).

Table 1. PROGDEM objectives

Types of goals	
Strategic objectives or goals (Overall objectives)	- Improving citizens' living conditions and protecting their health (preserving public hygiene and the cleanliness of villages and towns) ; - Safe and environmentally sound waste disposal ; - Recycling recyclable waste ; Creating green (permanent) jobs ; - Reducing waste at source ; Environmental education.
Specific goals (Results)	- Eradicate illegal dumping practices, - Organize the collection, transportation, and disposal of household waste under conditions that guarantee environmental protection and the preservation of environmental hygiene ; - The construction, development, and equipment of technical landfill sites (CET) - Inform and raise awareness among citizens about the risks posed by waste and its impact on health and the environment.
Operational objectives (Achievements)	- Rehabilitation of controlled landfills ; - Construction of controlled landfills ; - Construction of waste collection points and sorting lines ; - Creation of EPICs (the case of Tizi-Ouzou : EPIC CODEM) ; - Creation of waste management companies.

Source : Made by us from our readings

The practice used in Algeria to dispose of waste is technical landfills (CET). ''*The objective of waste burial is to ensure effective and sufficiently durable containment of waste as well as appropriate control of the two types of effluent generated, leachate and biogas, which are the main cause of the environmental and health impacts of landfills*'' (KEHILA, 2018, p. 3). PROGDEM's mission is to install a CET in each wilaya. This is a

classified facility that receives HW for burial in pits called *''Casiers''*. *''Generally, to ensure the profitability of CETs, they are built for a population of 100,000 inhabitants or more or as part of an inter-municipal grouping.''* (DILMI, 2015, p. 5). It also includes : A service or control area for the admission and weighing of waste ; a leachate treatment plant and the whole are connected by a road network and a sorting center at the service area. This is a solution to eradicate illegal dumping. *"In Algeria, MATET recorded more than 3,000 illegal dumps, representing a loss of some 150,000 hectares of agricultural land"* (KEHILA, 2018, p. 3).

2.2. Conceptual Framework of Sustainable Development:

With the rise of environmental issues around the world, Algeria has taken its position in environmental protection by integrating into its political debates the notion of SD which is defined as a development *''which meets the needs of the present without compromising the ability of future generations to meet their own needs''* (Bruntland Report, 1987). It is a development which *''aims for a triple objective : improving economic efficiency (reducing costs, additional costs and waste), maintaining a healthy and rich environment with an essential ecological approach while preserving social equity in order to meet the basic needs of the population.''* (ANNANE-BELKIS & AHMEDZAID, 2013, p. 2)

Sustainable waste management is necessary to reduce the ecological footprint of human beings, conserve natural resources, achieve social equity, and promote a circular economy, without forgetting the importance of involving various stakeholders, whether public or private, as they play a very important role in the management of local affairs. HWM is a key element of SD ; it includes several aspects : reduction at source, reuse, recycling, and energy recovery.

2.2.1. Definition of the Concept of Sustainable Development:

Since the 1980s, we have witnessed the birth of the notion of SD. This new concept was added to the environmental dictionary, which aims to reconcile economic development, social well-being, and environmental protection. It is a new mode of development that takes into account the needs of current generations without compromising those of future

generations.

Sustainable development is a concept found in ‘‘the discourses and actions of actors involved in environmental and development issues’’ (Vivien, 2007, p. 3). According to (Waas, et al., 2014), SD conveys a set of characteristics that must be respected regardless of the vision pursued. He adds that these characteristics can be considered principles or rules of action for SD. These fundamental principles, which are of equal importance, are four in number : *‘‘the equity principle, the dynamism principle, the integration principle, and the normativity principle.’’* Regarding the principle of equity, it encompasses ‘‘justice/fairness’’ which is divided into : inter- and intra-generational equity, interspecific (inter-species) equity, geographical equity and procedural equity.

On the other hand, for the principle of dynamism, they add that as the environment and society are in possible evolution, SD is considered to be a process that changes, therefore SD is a process that requires a precautionary approach given the uncertainties and risks it faces today. For the principle of integration, they specify that it represents the reconciliation of the different objectives of traditional development (socio-economic and institutional) with environmental objectives and, finally, the principle of normativity. They articulate it on the normative nature of SD, as the latter is always socially constructed, which ensures in particular to make normative decisions and choices that are anchored on values that we maintain in this case today and in the future. SD is based on three pillars : economic, social and environmental, and this concept lies at the crossroads of these three spheres : economic, social and environmental, the main objective of which is to meet the needs of the present without compromising the ability of future generations to meet their own needs (Bruntland Report, 1987).

2.2.2. Definition of the Concept of Sustainability in HWM:

The concept of SD is based on the consideration of three essential dimensions that we have mentioned previously : economic, social and environmental ; to which we add the dimension of culture and that of governance. The concept of sustainability in HWM refers to an efficient management to satisfy current needs without compromising the needs of future generations to satisfy their own. HWM constitutes a key element of

SD.

The ecological dimension aims to protect the environment, minimizing negative impacts on it and reducing the ecological footprint, preserving nature and conserving natural resources from various types of pollution. The economic dimension of SD, on the other hand, seeks to establish economic models that support sustainable production methods by introducing environmentally friendly behaviors into their daily practices.

Regarding the social dimension, it focuses on addressing social inclusion and inequalities, poverty reduction, and establishing social justice. This dimension can be divided into social and societal development.

Regarding governance, also considered another essential pillar of SD, (Combe, 2015) defines governance as *''imperative necessity for sustainable development.''* It targets two objectives simultaneously : a purpose and a tool for applying and implementing SD. (Combe, 2015) adds that governance can be understood through two dimensions, namely responsibility and solidarity. This involves using a participatory and collaborative approach that involves various stakeholders in decision-making for development, but also establishes consultation and dialogue between these different actors to serve them and SD.

In addition to these four dimensions, another pillar of SD is added : culture. *''The cultural dimension has become a central element of discourse on sustainable development, to the point of being presented by some (Nurse, 2006) as the fourth pillar of sustainable development''* in (Porcedda & Petit, 2011), alongside the economic, social, and environmental pillars.

Waste poses a threat to humans and their environment ; the quantities of waste generated daily are constantly evolving. To promote and implement SDGs, different public policies are implemented to reconcile the different dimensions of SD. In our case, we focus on local public policy on HWM to demonstrate the correlation between the effectiveness of different HWM practices and SD to see what are the benefits of integrating HWM into SD initiatives.

2.3. Methodological Framework (Evaluation of the Effectiveness of Local Public Policy for the HWM:

2.3.1. Presentation of our study (survey):

The effectiveness of public HWM policy is a crucial issue in achieving SDGs. It is through this evaluation that policymakers can assess the results produced by the implemented policy and estimate the achievement rate of concrete and desired objectives, as well as the degree of their participation in achieving these SDGs.

To effectively implement the programs implemented and assess the achievement rate of the objectives set out by this policy, the evaluation can be approached according to various criteria : effectiveness, efficiency, relevance, sustainability, and the level of involvement and participation of the various stakeholders. This evaluation aims to highlight the success or failure rate of this policy and to take appropriate decisions and necessary measures, whether corrective in the event of failure or perfectionist in the event of success.

To complete our research, we conducted a field survey targeting the municipality of Tizi-Ouzou, the capital of the wilaya, and the technical landfill sites in it. We conducted a retrospective study analyzing the evolution of the quantities of waste produced in the municipalities attached to the landfill site and the evolution of the quantities buried and recovered over the period from mid-May 2009, the opening date of this landfill site, to December 12, 2022. The field survey was conducted through semi-structured and structured interviews with the managers of the landfill site and some officials from the environmental departments and the municipality, capital of the wilaya.

The database for our research was also based on observations, documentary research, and data provided by the departments that were surveyed. We then conducted a prospective study based on reports provided by these departments regarding the projection of waste management into the future. We also paid particular attention to the study on the National Strategy and Action Plan for Integrated Waste Management and Recovery to 2035.

To operationalize our research, we conducted a quantitative and

qualitative analysis, referring to performance indicators that we calculated from data collected in the field and our readings conducted as part of our research. First, we will highlight the results obtained in the field in the following section. Processing the collected data led us to take stock of the actual achievements and objectives achieved within the framework of the implementation of the PROGDEM. Second, we will evaluate these achievements to determine the degree to which the objectives outlined in the latter have been achieved. Finally, we will conclude our research with a conclusion where we will report the main results, the obstacles encountered in the application of PROGDEM and the perspectives of the research.

2.3.2. Review of the Criteria used to assess the Effectiveness of the Local Public Policy of SWM:

We have selected the following indicators to examine the degree of effectiveness of this public policy and the degree of achievement of SDGs.

- **The Rate of Waste Generated** (reduction of waste at source) : It represents the percentage of HW generated by households. The objective of knowing this indicator is to observe its evolution from one year to another and compare it to the objectives set by local public policy. Its goal is to reduce waste production at source by encouraging households to design responsible consumption and persuade them to adopt responsible consumption practices to reduce and minimize waste production. But this practice is not limited to households, as it also encourages firms to undertake initiatives to design ‘‘eco-designed products’’ to limit the production of non-recyclable materials and design products with recyclable materials, knowing ‘‘the best waste is that which is not produced’’.
- **The Collection Rate :** HW collection is handled by municipal services which are responsible for HW removal, as well as street and road cleaning. HW generated by households is collected at collection points (collective containers or bins). Each municipality defines its responsibility for waste management and organizes waste collection and removal and street cleaning according to its capacities and specificities. Also, the municipality receives taxes, duties and fees on the collection,

transportation, storage and disposal of waste or any other services related to the management of household and similar waste, as specified in Article 59 of Law No. 01-19. Regarding waste transportation, we can say that it is the municipalities that are responsible for it except for municipalities that have an EPIC, in which case it is the latter that is responsible for it. Knowing that the means of transport differs from one municipality to another given the difficulty of access to certain neighborhoods or villages.

- **Waste Sorting Rate :** The crucial objective of any waste management is to reduce the amount of waste produced every day. Reducing the amount of waste to be landfilled is done by the end consumer at home. In the wilaya of Tizi-Ouzou, selective sorting is in its embryonic phase, it takes place at landfills, at the sorting chain and/or by identified collectors, or recovery is done by unidentified collectors who operate in the informal sector ; going door to door to recover waste that can be recovered either for free or at insignificant prices.
- **Waste Treatment Rate (landfill %, recycling % and recovery %) :** The treatment of household and similar waste is the responsibility of the Municipal People's Assemblies (APC), as specified in Decree No. 84-378, which sets out the conditions for the cleaning, removal, and treatment of urban solid waste, and Law No. 01-19, which establishes the responsibilities of municipalities regarding the management of household and similar waste. The treatment method used in Algeria is technical landfill. The province of Tizi-Ouzou has four technical landfill sites and one sorting center located within the Oued-Falli waste collection center. Waste constitutes a source of raw materials ; its recovery serves both economic and environmental purposes. Waste recovery aims to reduce the landfill rate. The quantities recovered at the sorting center are sold to the highest bidder. However, as previously noted, a large portion of the waste is recovered and recycled by waste pickers in the informal sector.

3. Discussion of the Results: the different impacts

The conclusions in this study inform us about the achievements made at the level of the wilaya of Tizi-Ouzou within the framework of

PROGDEM which was implemented in 2002. This research led us to bring out the following different impacts.

3.1. The Effectiveness of Rational Treatment and Healthy and Environmentally Friendly Disposal of Waste:

This efficiency can be illustrated through the various measures taken for the treatment of household waste, and the various indicators that refer to it. This can be manifested through the establishment of the various treatment infrastructures, but also from the assessment of these treatment methods, of this type of waste which does not harm the environment and public health. The efficiency of these different infrastructures and installations will also be evaluated in terms of capacity and degree of their participation in environmental protection and the achievement of SDGs. Our study has demonstrated that the only type of waste treatment at the level of the wilaya of Tizi-Ouzou is technical landfill.

The collected waste is transported directly to the CET of Oued-Falli for weighing and then to the sorting line so that it lands in the bin. The first bin with a duration of 08 years is saturated and the filling rate of the second bin is 42% (CET of Oued-Falli, 2018), according to the words of the head of the CET, the lifespan of these bins will be extended given the characteristics of household (organic) waste for the years to come. Currently, both bins are full. Therefore, we can conclude that the waste disposal center is not effective because its lifespan was 15 years (saturation of both bins), knowing that its initial lifespan was estimated at (8+15) years, which logically means that it will be operational until 2031.

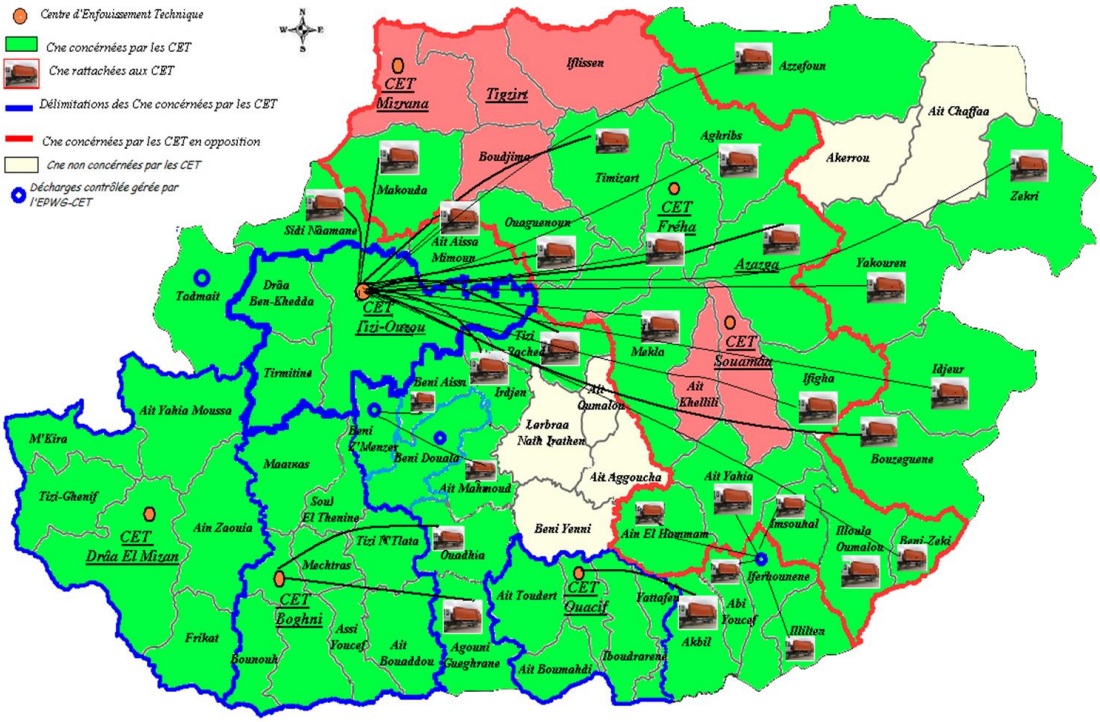
The initial number of municipalities for this waste disposal center is three (03), and sixteen (16) municipalities have been attached to it (see the following map). Today, the number of attached municipalities is (23 out of 67) municipalities, (1/3) of the municipalities in the wilaya of Tizi-Ouzou. However, we can say that this type of waste treatment is ineffective, even unsustainable, because the burial of waste from other municipalities has negatively affected the lifespan of the two bins. Landfilling waste generates leachate and biogas, which are the only drawbacks of this treatment method. Left untreated, they pose a real threat to the environment and

public health. This, poses a real challenge for this EPIC to manage these influxes.

Adding to this, landfilled waste is not considered final waste, so this last criterion is not met, hence the saturation of the CET. Perhaps if this CET had not included the other municipalities, and given the type of waste, more than 60% of which is organic waste, today, it is quite possible that it would be considered effective.

The attachment of these municipalities to the CET has generated negative externalities which are represented by the non-respect of the principle of proximity. This waste, which is not treated on the territories of these municipalities from which it is generated, is transported and brought to the CET, moving and covering long distances (example of the municipality of Bouzeguene which is located more than 60 km away). The transport of this waste also generates noise pollution. Another externality which arises is the overflight of waste when the transport does not meet the standards.

Fig.1.localisation of the municipalities attached to Oued - Falli CET

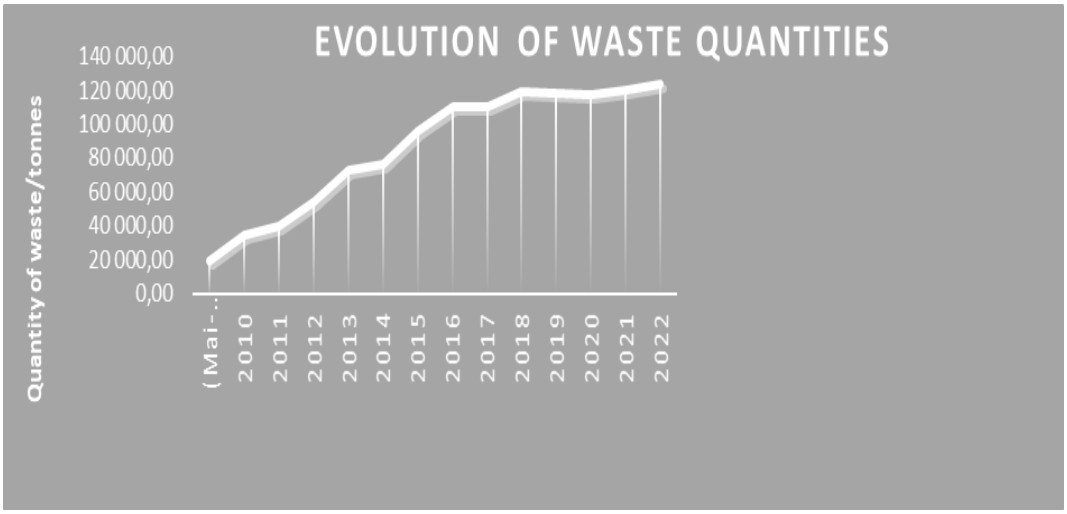


Source : Oued Falli technical landfill site, 2023

3.2. Reducing Waste Production at Source:

Based on the analysis of the indicators relating to this axis, we concluded that the efforts made by local authorities in implementing PROGDEM have shown their effectiveness in reducing the quantities of waste in cities and their surroundings. This is evident through the eradication of illegal dumping, the organization of collection, transportation and disposal of HW in conditions that guarantee environmental protection, the preservation of public hygiene ; as well as the cleanliness of villages and cities. This achievement is explained by the number of illegal dumping sites eliminated and the volume of HW collected, as shown in the following diagram :

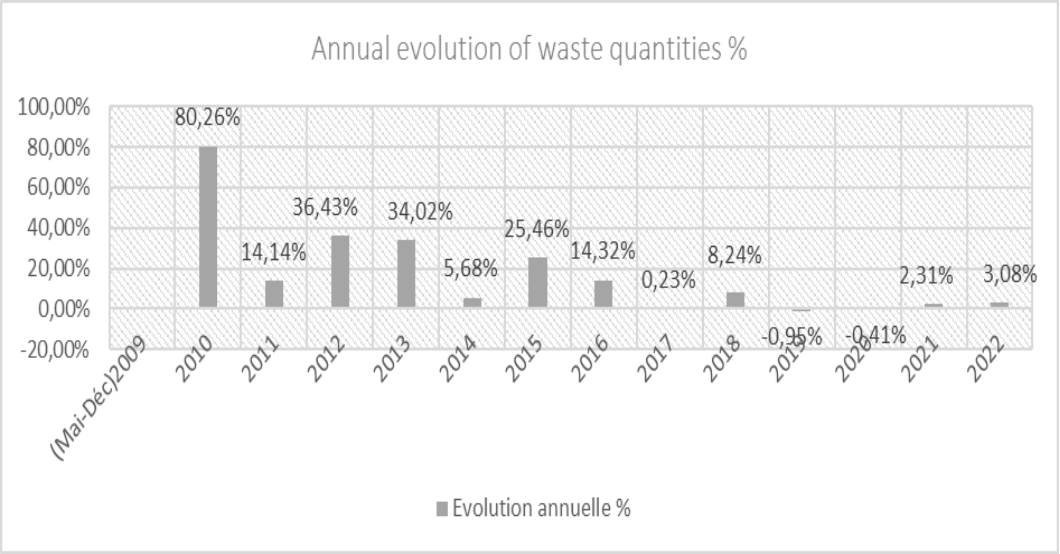
Fig. 1. Evolution of the quantities of waste collected during the period (2009-2022) at the level of CET of Oued Falli



Source : Made by us from data collected in the field.

The graph above shows us that the quantities of waste which is collected continue to increase. This increase is justified by massive volunteering, the eradication of illegal dumps and landfills, the attachment of other municipalities to the CET of Oued-Falli and this is also due to the improvement of their collection. But if we observe carefully, we notice that in recent years, the rate of change in the quantities admitted at the CET is practically stable. How can we explain this situation ? The following graph shows us this situation very well.

Fig. 2. The annual rate of change in the quantities of waste collected by the Oued Falli CET during the period (2009-2022)



Source : Made by us from data collected in the field

From our field survey, we deduced the following conclusions : the first observation concerns the year (2010), where the rate of change is (80%). This change is due to the commissioning of the Oued Falli CET in mid-May 2009. The second concerns the period (2012-2013), its change is due to the attachment of other municipalities to the CET. The third period is that of 2017, when the sorting chain was put into operation, which explains the decrease in the quantities of waste sent to landfill. The fourth period is that from 2019 to 2020, which coincides with the period of the COVID-19 pandemic. The rate is negative, that explains the decrease in the quantity of waste collected which is due to the decrease in the number of rotations. Also the number of workers contaminated by this COVID-19, as well as the closure of restaurants and fast food.

The fifth and last conclusion we reached is that, if they did not attach the other municipalities to the CET of Oued-Falli, it will currently be half full knowing the initial municipalities produce almost 50% of the buried waste as the following graph shows (2022).

Fig. 3. Percentage of Waste Quantities Admitted to the CET in 2022.

Source : Made by us from data collected in the field.

This graph shows us that the quantities of waste produced by the municipalities attached to the CET of Oued-Falli are practically higher than those produced by the initial municipalities (APC TO, DBK, Tirmitine), this explains that the burial would have been effective if they had not attached another municipality to the CET.

3.3. Waste Recovery and Recycling :

The criterion for effectiveness in this case is the level of the recovery rate, as well as the recycling rate. Considering the results in terms of the evolution of these two rates over time and the importance of the measures taken by the policy to promote this type of measure, whenever the recovery and recycling rate is too high, the waste management policy is effective.

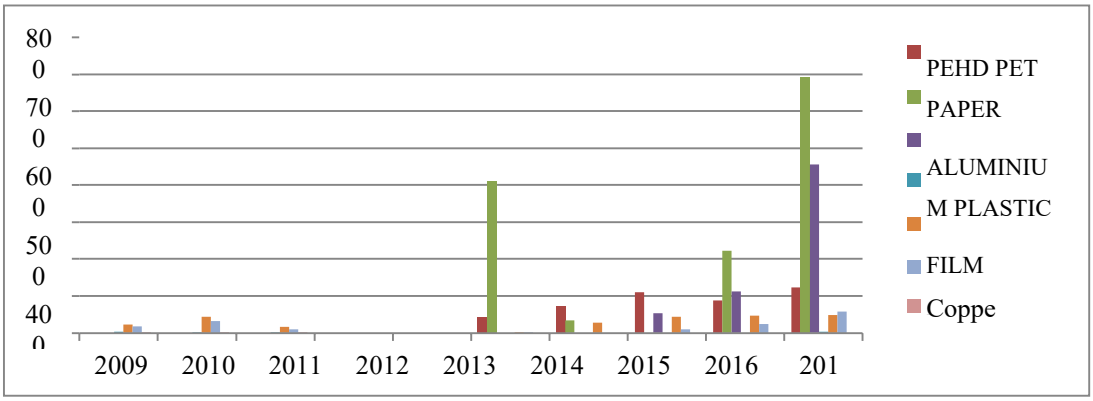
Regarding waste recovery in the municipality of Tizi-Ouzou, it is legally carried out at the CET level, whether through the sorting chain or in bins, but also in the pilot neighborhoods where selective sorting is installed. The quantities recovered for recovery are insignificant compared to the quantities of waste buried.

This also reflects the lack of widespread selective collection outside of pilot neighborhoods. The recovery rate informs us of this reality, because as long as the recovery rate does not exceed 50%, or even 75% in developed countries, management is neither efficient nor sustainable.

Adding to this, the quantities of waste recovered in the informal circuit where enormous quantities of waste are collected by unidentified collectors. The following diagram shows us the low recovery rate which

remains negligible compared to what is buried.

Fig. 4. Evolution of Quantities of Waste Recovered by Type of Waste



Source: Made by us based on data collected in the field.

If we examine the diagram below, we will see the quantities of waste recovered by type at the Oued-Falli sorting center, we notice that the quantities of PET, paper and PEHD are high compared to the other types of waste recovered. This is due to the informal sector which intervenes upstream. If we carefully examine this diagram, we notice that the quantities of recovered waste are high from 2016. From 2017 are much higher. This remarkable evolution is due to the start-up of the sorting chain which was officially inaugurated in July 2017.

3.4. Creation of Green (permanent) Jobs:

One of the objectives of PROGDEM is the creation of permanent, sustainable jobs. These jobs are referred to as green jobs. In the province of Tizi-Ouzou, numerous waste management companies have been established, creating jobs. In addition, the Public Establishment for the Management of Technical Landfills in the province of Tizi-Ouzou (E.P.W.G – C.E.T) manage four landfills and two controlled landfills, in addition to the IPIC CODEM, which employs a significant number of workers. There are 90 companies (CCI Djurdjura, 2018) in the waste management sector in the province of Tizi-Ouzou, a number considered low compared to the objectives of PROGDEM, which was established in 2002.

3.5. Governance, Consultation and Coordination between Stakeholders:

Effectiveness in terms of governance among stakeholders is an assessment that takes into account : the degree of participation of the various actors in HWM ; the quality, type, and degree of coordination between the various stakeholders ; and the degree of transparency in decision-making, including consultation and coordination.

Through our investigation, we found that the three waste management centers that were not built due to opposition from the local population (Freha waste management center, Boubhir, and Mizrana waste management center) are a vivid example of the lack of coordination and consultation between local populations and the institutions involved in the implementation of these facilities. We witnessed a standoff between the authorities and local populations to prevent the creation of these vital facilities for these and neighboring municipalities, projects that would definitively resolve the HW problem. To this end, ‘‘*the use of landfills (both illegal and controlled) as à management method remains widespread in the province of Tizi-Ouzou. Data from the 2016 statistical yearbook of the wilaya of Tizi-Ouzou report the existence of 948 dumpsites and illegal dumpsites throughout the territory*’’ (Aoudia & Abrika, 2022, p. 199). For the sake of sustainability in HWM, it is appropriate to design a solid basis for decision-making by involving all stakeholders to promote an integrated approach to waste management by acting transparently with the consultation of these stakeholders.

4. Conclusion

Reducing waste quantities at the source, under conditions that guarantee environmental and public health protection, is one of PROGDEM’s priorities. Regarding the safe and environmentally sound disposal of waste, the storage capacity of the wilaya’s technical landfill is expected to double, while compacting 50% of the buried waste, and considering the wet nature of the waste. Once the first bin is full, the second bin’s lifespan will be extended until 2023. As the head of the landfill told us, even after the last bin is filled, it will be operated at an elevated position

(dome-like), given the favorable site layout, until reaching the level of the first bin, which will extend the bin's lifespan, given that 16 municipalities have been added to it in addition to its initial three. The province of Tizi-Ouzou has successfully closed and rehabilitated a significant number of illegal dumpsites. They have benefited from development and equipment, enabling them to properly manage household waste. However, a significant number of illegal dumps have received little basic development to ensure a minimum of control and protection for neighboring populations, as these dumpsites and illegal dumps are spontaneously established, without fences, access roads, and even without security.

The installation of the sorting center has enabled the promotion of recovery, treatment, and recycling activities, although the recovery rate is insignificant compared to the rate of waste sent to landfill. This recovered waste will increase the storage capacity of the site until the end of 2021, according to the same official. Regarding the creation of green jobs, the role of companies operating in the private sector remains limited. The number of microenterprises, created within the framework of the National Agency for Youth Employment Support (ENSEJ), remains low. Pilot operations have been launched in pilot neighborhoods for selective sorting, but the results have not been satisfactory. And the informal sector remains difficult to gauge, knowing that waste management is everyone's business,

At the end of our research, we found that the implementation of PROGDEM, in the province of Tizi-Ouzou, faces numerous challenges. Despite the efforts made to eradicate illegal dumping practices, improve citizens' living conditions, and protect the environment, we conclude that PROGDEM has made a significant contribution to the effectiveness of local public policies regarding HWM in the province of Tizi-Ouzou.

However, PROGDEM alone cannot impact the effectiveness of HWM management due to a lack of cohesion and synergies between the various stakeholders, as integrated and sustainable HWM that respects economic, social, and environmental efficiency is everyone's business. Therefore, continuous and regular evaluation is required to highlight the weaknesses and strengths of PROGDEM to achieve this, and to make corrections, adjustments, or improvements to the results obtained.

To optimize the effectiveness of local public policies for HWM in order to achieve territorial development objectives, it is essential to :

- Involve and mobilize various local stakeholders and residents in the development of these policies.
- Establish useful indicators for monitoring the policy in a regular and comparable manner.
- Adopt an integrated approach that connects the different dimensions of SD
- Introduce innovative management methods and build innovative, sustainable facilities.
- Diversify information, training, and awareness-raising to increase citizen engagement.

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