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Participatory Approach to Waste Management as an Entry Point for Activating the Circular Economy – An Analysis of Global Experiences, with Reference to Algeria

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Abstract:

This study sets out to analyze the role of the participatory approach to waste management as a strategic entry point for activating the circular economy, drawing on an examination of leading international experiences. Adopting a descriptive approach, the study analyzes three global models: the Latin American model, built on the integration of the informal sector; the European model, centred on citizen engagement and participatory planning; and the Southeast Asian model, grounded in institutional partnership and technological innovation. The critical analysis reveals that the success of each experience was tied to specific contextual factors, and that the optimal solution lies in adapting the approach to local particularities. With respect to Algeria, a SWOT analysis reveals promising potential alongside fundamental challenges that call for an integrated model combining social inclusion, community awareness, and technological innovation.

Keywords: participatory approach; waste management; circular economy.

الملخص:
تهدف هذه الدراسة إلى تحليل دور المقاربة التشاركية في إدارة النفايات كمدخل استراتيجي لتفعيل الاقتصاد الدائري من خلال دراسة تجارب دولية رائدة. اعتمدت الدراسة على المنهج الوصفي وتحليل ثلاث نماذج عالمية: نموذج أمريكا اللاتينية القائم على دمج القطاع غير الرسمي، النموذج الأوروبي المرتكز على إشراك المواطنين والتخطيط التشاركي، ونموذج جنوب شرق آسيا المعتمد على الشراكات المؤسسية والابتكار التكنولوجي. كشف التحليل النقدي أن نجاح كل تجربة ارتبط بعوامل سياقية محددة، وأن الحل الأمثل يكمن في تكييف المقاربة مع الخصوصيات المحلية. بالنسبة للجزائر، أظهر تحليل SWOT وجود إمكانيات واعدة لكن مع تحديات جوهرية تتطلب نموذجا متكاملا يجمع بين الإدماج الاجتماعي والوعي المجتمعي والابتكار التكنولوجي.

كلمات مفتاحية: المقاربة التشاركية؛ ادارة النفايات؛ الاقتصاد الدائري.

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1.INTRODUCTION

The contemporary world is undergoing radical shifts in patterns of production and consumption, as environmental and economic sustainability has become a pressing necessity rather than a secondary option. Amid mounting pressure on natural resources and the worsening problems of waste and pollution, the concept of the circular economy has emerged as an alternative to the traditional linear economy, which rests on a "take–make–dispose" pattern.

The circular economy represents an inherently regenerative economic system that seeks to preserve the value of products, materials, and resources for as long as possible while minimizing waste. Achieving this transition, however, requires more than innovative technologies or government policies alone; it calls for the genuine engagement of all stakeholders citizens,

civil society, the private sector, and government institutions.

It is against this backdrop that the participatory approach emerges as a strategic entry point for activating the circular economy, particularly in the field of waste management, which constitutes the essential starting point for circular practices. Community participation is not confined to the implementation of programmes; it extends to planning, monitoring, and evaluation, thereby ensuring the sustainability of initiatives and their suitability to local contexts.

This study builds on an analysis of a set of international experiences that have demonstrated tangible success in integrating the participatory approach within circular-economy strategies, with a focus on the mechanisms and enabling factors that contributed to the success of these experiences, the challenges they faced, and the lessons that can be drawn from them.

Research Problem

On this basis, the study's central question can be formulated as follows: How does the participatory approach to waste management contribute to activating the principles of the circular economy in light of selected international experiences?

From this problem, the following sub-questions are derived:

- What is the content of the participatory approach to waste management, and what are its theoretical and procedural foundations?
- What mechanisms have successful international experiences relied upon to activate community participation, integrate the informal sector, and build partnerships?
- What lessons can be drawn from these experiences, and how can they be applied in the Algerian context to activate the circular economy?

Significance of the Study

This study derives its significance from several scientific and practical considerations. It contributes to filling a knowledge gap in the Arabic-language literature regarding the interactive relationship between the participatory approach and the circular economy. Although each concept has been studied extensively in isolation, research addressing their intersection and synergy remains limited, particularly within the Arab context. The study also offers an integrated conceptual framework linking the participatory approach with the principles of the circular economy, thereby enriching the academic debate on models of sustainable development.

Objectives of the Study

-Identify the mechanisms and practical applications of the participatory approach in waste management and in achieving the circular economy;

-Analyze successful international models in applying the participatory approach and link them to circular-economy outcomes;

-Identify the challenges and obstacles facing the application of these models in different contexts.

Methodology

The study adopts a qualitative, comparative case-study design grounded in documentary and secondary-source analysis. This design was chosen because the research question is exploratory and configurational in nature it seeks to understand how differing institutional arrangements translate a common principle (stakeholder participation) into differing waste-management outcomes across dissimilar contexts, a question for which a comparative multiple-case approach is methodologically appropriate (Yin, 2018).

The three cases Latin America, the European Union, and

Southeast Asia were not selected arbitrarily. They were purposively chosen according to a most-different-systems logic, so as to maximize variation along three dimensions that the literature identifies as decisive for participatory waste governance: the degree of formality of the actors involved (informal-sector-led vs. citizen-led vs. state–private-partnership-led models), the level of economic development, and regulatory tradition (decentralized municipal governance vs. centralized institutional governance). This variation allows the comparative analysis to identify which enabling mechanisms are context-bound and which recur across otherwise dissimilar settings a form of analytic, rather than statistical, generalization.

Data were drawn from two triangulated sources: (i) peer-reviewed academic literature selected for thematic relevance to participatory waste governance and the circular economy; and (ii) institutional and grey literature reports issued by the Ellen MacArthur Foundation, UNEP, the European Commission, and national waste-management agencies used to corroborate and update the academic findings with policy-level evidence. For the Algerian case specifically, the analysis is further anchored in official statistical and regulatory sources, namely the reports of the National Waste Agency (Agence Nationale des Déchets, AND) and the Ministry of Environment and Quality of Life, together with the national legal and strategic instruments governing the sector (see Section 4.1).

It should be noted, as a methodological limitation, that the analysis relies on secondary and documentary data rather than on original primary data collection (e.g., structured interviews with waste pickers or municipal officials, or survey-based measurement of citizen participation). This choice is consistent with the study's exploratory, comparative objective mapping mechanisms across three continents within the scope of a single

article but it means the findings concerning enabling factors and success conditions should be read as analytically derived propositions rather than as empirically tested causal claims. The Algerian component of the study is accordingly framed as a policy and institutional diagnostic (through document analysis and a SWOT synthesis of secondary data) rather than as a field-based impact assessment. Future research building on this study would benefit from primary data collection semi-structured interviews with informal waste pickers and municipal actors, and household surveys on source-separation behaviour to empirically test the transferability of the lessons identified here to the Algerian context; this is flagged as a direction for subsequent work in Section 5.

2. Core Concepts

2.1. The Concept of the Circular Economy

Definitions of the circular economy vary across international bodies. According to the Ellen MacArthur Foundation, it is a regenerative economic system that aims to decouple economic growth from resource consumption by keeping materials and products at their highest possible value within technical and biological cycles (Ellen MacArthur Foundation, 2015). The United Nations Environment Programme, for its part, regards it as a model that preserves the value of resources for as long as possible through reuse, recycling, and waste reduction (UNEP, 2020), while the European Commission views it as a model of production and consumption based on sharing, repair, refurbishment, and recycling in order to extend the life cycle of products (European Commission, 2020). On the basis of these definitions, the circular economy can be regarded as a participatory economic model that redesigns systems of production and consumption to achieve optimal resource use and minimize waste through the involvement of various actors.

The importance of the circular economy is evident across four interrelated dimensions: environmentally, it curbs resource depletion and emissions and protects biodiversity (Giglio et al., 2021); economically, it enhances the efficiency of resource use and generates employment in repair, refurbishment, and recycling sectors while supporting innovation and competitiveness (Bao et al., 2019); socially, it contributes to improving quality of life, promoting social justice, and empowering communities (Ahmed & Ali, 2006; Ziegler, 2019); and strategically, it is linked to the achievement of the Sustainable Development Goals and states' environmental commitments. This interconnectedness makes the circular economy a comprehensive model for sustainable development.

2.2. The Concept of the Participatory Approach to Waste Management

The participatory approach is defined as the process through which citizens, local communities, and stakeholders are engaged in the various stages of planning, implementing, and evaluating waste-management systems, with the co-production of waste-management services contributing to the building of more inclusive and cleaner cities (Gutberlet, 2015). This approach goes beyond the traditional notion of participation, focusing instead on establishing sustainable mechanisms of cooperation among local authorities, citizens, the private sector, and non-governmental organizations, while taking into account the social and economic characteristics of local communities (Chakrabarti et al., 2009). The participatory approach is gaining growing importance owing to the gains it delivers on three levels: economically, it reduces treatment costs and generates returns through the recovery of recyclable materials; socially, it enhances environmental awareness and improves waste-handling behaviour (Kalra, 2019); and environmentally, it

reduces the quantities of waste generated and increases recycling rates, leading to more sustainable solutions (Hornsby et al., 2017).

2.3. The Integrated Relationship between the Participatory Approach to Waste Management and the Circular Economy

The interaction between the participatory approach to waste management and the circular economy represents a complementary relationship, in which this approach constitutes the first step towards a transition to a sustainable economy through an entry point with a social dimension. Applying the participatory approach requires adopting practical mechanisms and strategies encompassing three main pillars:

- Integrating the informal sector: Integrating waste pickers into the formal framework represents a decisive strategy, particularly in developing countries. Gutberlet et al. (2017) stressed the need to involve them in the formulation, implementation, and evaluation of public policies. This requires legal recognition of their role, the provision of technical and financial support, improved working conditions and social protection, and facilitation of their organization into cooperatives. The success of this integrative model depends on developing effective partnerships between the public and private sectors, and on cooperation among local governments, universities, and non-governmental organizations (Gondak et al., 2025);
- Citizen engagement and participatory planning: Establishing mechanisms for ongoing dialogue and communication is the first step towards participatory planning, which entails involving all parties from the earliest stages of designing waste-management programmes, since the use of a multi-criteria,

participatory approach leads to more effective and more widely accepted solutions (Perez et al., 2021). This is achieved through environmental awareness-raising, education, and outreach campaigns aimed at fostering responsible and active citizenship (Younis & Mamdouh, 2021);

- Encouraging local innovation to valorize waste: Local innovation refers to the development of improved solutions that transform waste from a burden into a resource of economic value, drawing on locally available knowledge and capacities (Van Berkel, 2007). Its importance derives from its suitability to the local context, its economic sustainability, its capacity to create jobs, its promotion of community ownership, and its adaptive flexibility (Von Malmborg, 2007; Roberts, 2004). It encompasses technological innovation, business models, social and institutional innovation, policies and legislation, and services related to reuse (Chin & Mees, 2021).

3. Leading International Experiences in Applying Participatory-Approach Mechanisms for Waste Management within the Circular Economy

Numerous international experiences have proven successful in applying the participatory approach to waste management by engaging various stakeholders citizens, the informal sector, government, and the private sector. These experiences highlight the different roles played by these actors through the mechanisms of an approach that has driven a circular economy built on waste recycling.

3.1. The Latin American Experience Based on Integrating the Informal Sector

The integration of "waste pickers" in the countries of Latin

America stands as one of the most prominent examples of the social participatory approach to waste management and support for the principles of the circular economy, achieved through the application of a mechanism for integrating the informal sector into waste management. Countries such as Brazil, Argentina, and Colombia have organized waste pickers into associations or cooperatives through formal recognition, involving them in the formulation of national and local waste-management policies by way of representation on advisory councils and committees (Gutberlet et al., 2017). The participatory mechanisms are centred on transforming and organizing the informal sector and converting it into a formal partner through: Organization into formal cooperatives: These operate as legal entities recognized by city authorities, and constitute the primary vehicle for managing the collection and sorting of recyclable materials in the first instance (Villalba, 2021); Formal partnership and contracting: These cooperatives are granted exclusive operating zones within the city under formal contracts, ensuring them a steady flow of recyclable materials; this co-management model formed part of the development of a comprehensive system for processing recyclable waste (Carenzo & Sorroche, 2021); Social and financial empowerment: Cooperatives receive financial and technical support through the provision of work equipment and facilitated access to sorting sites, in addition to worker training, the provision of stable income, and integration into social-security and health-insurance systems (Becerra et al., 2020).

All of this has translated into a positive impact on recycling efficiency, through a significant improvement in the efficiency and quantity of recovered materials, thereby contributing to reducing the waste directed to landfills and generating economic value from resources (Villalba, 2021), in addition to formalizing labour, whereby a large share of informal labour has been

converted into organized, rights-bearing formal employment supporting social justice and addressing the structural poverty associated with urban waste management, which in turn has improved environmental governance and resource conservation through integrated solutions (Hornsby et al., 2017).

3.2. The European Experience Based on Citizen Engagement and Participatory Planning

European countries, in a number of their cities such as those in Sweden and Germany, have focused on citizen participation and participatory planning to ensure the success of circular-economy policies in general, and to improve the waste-management process in particular. The participatory approach here revolves around making the citizen a core, accountable partner through:
Source-separation of waste: Strict, standardized systems for sorting waste at home and in businesses are applied, with municipalities providing the necessary infrastructure, such as multi-coloured bins and specialized centres; citizens share responsibility for the precise separation of waste (paper, plastic, glass, organic matter) as a prerequisite for the system's success. This behaviour is reinforced by awareness-raising and environmental-education campaigns (Izdebska & Knieling, 2020); Incentives and penalties: Some regions employ a "pay-as-you-throw" system as a participatory economic mechanism, whereby citizens are incentivized to reduce and accurately sort their waste, since collection fees are linked to the quantity disposed of the less waste produced, the lower the fee, and vice versa which encourages sustainable consumption and effective sorting (Awino & Apitz, 2024); In addition, local participatory projects have emerged as community initiatives, such as repair cafés and libraries of things, which rely on the voluntary participation of citizens to reduce waste generation and extend the lifespan of products (Awino & Apitz, 2024); Participatory

planning: Citizens, experts, and civil-society organizations are engaged in formulating strategic waste-management plans and in siting treatment facilities (such as recycling plants or incinerators). This integrated form of planning helps secure social acceptance for projects and ensures that solutions are designed to fit local conditions, to the satisfaction of all stakeholders (Izdebska & Knieling, 2020).

These countries have achieved the highest recycling rates in the world, with some regions reaching recovery rates approaching 99% of household waste (Lee et al., 2017), owing to citizens' full commitment to the rules. These outcomes stem from a sense of responsibility and environmental awareness among citizens, shaped through awareness, outreach, and education campaigns, together with the combined efforts of all parties involved.

3.3. The Southeast Asian Experience Based on Partnership and Institutional Innovation

The experiences of Southeast Asian countries such as Singapore and Vietnam in applying the participatory approach to waste management have relied on mechanisms different from those of Europe and Latin America, with emphasis placed on public–private partnership and technological and institutional innovation to achieve high efficiency in densely populated environments with diverse administrative systems (Ferronato et al., 2019). Singapore stands as a leading model of high-efficiency waste management, with its participatory approach resting on strict governance that integrates all parties through:

Rigorous institutional partnership: Singapore enforces an integrated, tightly regulated system that ensures the commitment of all stakeholders, through contracting with the private sector to manage collection and treatment operations in full, as well as digital citizen participation to facilitate compliance, alongside strict oversight and monitoring by the National Environment

Agency to ensure the achievement of the country's ambitious national circular-economy targets (Sarna & Plotnikova, 2025);
Technological innovation and infrastructure: Singapore has invested heavily in "waste-to-energy" technology and in integrating digital technologies for waste tracking and route optimization for collection, in addition to channelling investment into partnerships with research institutions and the private sector to develop innovative solutions for hard-to-recycle waste.

Vietnam has applied the principles of the participatory approach but has distinguished itself through a high degree of efficiency in waste valorisation, focusing on converting organic and inorganic waste into economic value by integrating the informal sector and encouraging its investment in recycling industries, alongside incentivizing the private sector to produce new materials such as fertilizers and fuel contributing to the creation of economic value and reduced reliance on landfills. The Southeast Asian experiences also demonstrate that the success of the participatory approach is rooted in market regulation and technological investment, whether through strict contractual governance or through support for the informal sector's capacity to maximize the benefit derived from waste. This underscores the diversity of the approaches adopted, with the success of each experience tied to the nature of the strategies employed (Ferronato et al., 2019).

4. Analysis of Algeria's Situation in Applying the Participatory Approach to Waste Management and the Circular Economy

Having reviewed the leading international experiences that achieved good results in applying the participatory approach to waste management, Algeria given its pursuit of development grounded in the circular economy must draw the lessons it can

benefit from and work towards their application. Before turning to a SWOT synthesis, it is useful first to situate this analysis within Algeria's actual regulatory and statistical record.

4.1. Institutional, Regulatory, and Statistical Context

Algeria's waste-management framework has developed incrementally since the early 2000s. Law No. 01-19 of 2001 on the management, control, and disposal of waste constitutes the sector's founding legal reference, and it was operationalized through the National Programme for the Integrated Management of Household and Similar Waste (PROGDEM), adopted in 2002, and later complemented by Executive Decree No. 04-199, which established the Éco-Jem scheme for packaging-waste recovery (Hassaine & Abrika, 2024). Implementation of these instruments has been coordinated by the National Waste Agency (Agence Nationale des Déchets, AND), created as the sector's technical regulatory body. More recently, the National Strategy for Integrated Waste Management and Valorization to 2035 (SNGID/NSIWM-2035) set an explicit national target of raising the recycling rate to 30% (Hassaine & Abrika, 2024).

Despite this legal and institutional architecture, implementation indicators remain modest. According to the AND's own annual reporting, less than 10% of municipal solid waste is currently recycled nationally, with the large majority still directed to technical landfills or, in a number of cases, uncontrolled dumping sites (Agence Nationale des Déchets, 2023). A complementary academic assessment of the sector reports that, of the waste stream analyzed for 2022, roughly 11% was recycled and under 1% was composted, leaving the great majority of the flow unprocessed (Hassaine & Abrika, 2024) figures that place Algeria well below the 30% target set by the SNGID-2035 and far below the recovery rates achieved in the European cases reviewed in Section 3.2. National waste

generation has also been reported at large and rising volumes, driven by urbanization and population growth concentrated in cities such as Algiers and Oran (Hassaine & Abrika, 2024).

With respect to the informal sector specifically, Algeria has not yet replicated the formal-cooperative model documented in the Latin American experience (Section 3.1). Informal waste pickers ("chiffonniers") continue to operate outside any legal or contractual framework: they are not formally recognized, are not covered by labour protections or social insurance, and operate in an unregulated resale market in which prices are set informally and can fluctuate at the discretion of intermediaries rather than through a stable contractual relationship with municipalities or recyclers (Wamda, 2017). This stands in direct contrast to the cooperative-contracting mechanisms described for Brazil, Argentina, and Colombia, and constitutes one of the clearest structural gaps identified in the SWOT synthesis below. Academic assessments of the Algerian strategy also point to a further structural constraint: the so-called "51/49" rule restricting foreign capital participation, which some analysts argue has limited the sector's access to the international financing and technology-transfer partnerships that supported the Southeast Asian experience reviewed in Section 3.3 (Hassaine & Abrika, 2024).

This regulatory and statistical picture a comparatively modern legal framework whose implementation still falls well short of its own targets, combined with an unintegrated informal sector provides the empirical anchor for the SWOT synthesis that follows.

1 4.2. SWOT Synthesis

Internal Factors	External Factors

Strengths (S) • Recent environmental laws and legislation • Growing number of green start-ups and green entrepreneurship • Digitalization of administrative services • Substantial latent economic returns	Opportunities (O) • Creation of new jobs • Reduction of the import bill • International partnerships for technology and expertise transfer • Rising demand for recovered materials
Weaknesses (W) • Lack of financial autonomy for municipalities • Absence of informal-sector integration • Weak community awareness and limited culture of source separation • Neglect of the principles of reuse and waste-generation reduction • Gaps and disparities in infrastructure	Threats (T) • Population growth and increasing waste quantities • Risks from environmental pollution and hazardous waste • Falling prices of certain virgin raw materials

Source: *prepared by the authors.*

The analysis shows that sustainable waste management in Algeria constitutes an environmental, economic, and social challenge; amid the global shift towards the circular economy, there is a clear need to adopt an effective participatory model bringing together the efforts of government, the private sector, civil society, and individuals. This approach aims to turn the waste crisis into a genuine development opportunity, by maximizing the benefit derived from available resources and achieving shared economic and environmental gains.

The SWOT analysis of Algeria's situation reveals promising potential set against structural challenges that require a strategic response. On one hand, Algeria possesses fundamental strengths, including a modern environmental legal framework, a growing number of start-ups in waste recycling, a drive towards

digitalization and e-governance, and substantial latent economic returns from secondary raw materials. These strengths intersect with promising external opportunities, such as the creation of thousands of green jobs, a reduced import bill, the benefits of international partnerships for technology transfer, and rising global industrial demand for recovered materials. On the other hand, Algeria faces critical weaknesses, most notably weak community awareness and a limited culture of source separation, the absence of informal-sector integration and the marginalization of waste pickers, the limited financial autonomy of municipalities, and a focus on recycling to the neglect of prevention and waste-generation reduction. These challenges are compounded by external threats such as rapid population growth and increasing waste volumes, pollution risks from hazardous waste (electronic and medical), and the global decline in virgin raw-material prices, which reduces the economic attractiveness of local recycling.

5. Conclusion

This study has shown that the participatory approach to waste management contributes to activating the circular economy by going beyond the technical and technological dimension to integrate the social, economic, and institutional dimensions within a unified system. The analysis of international experiences revealed a diversity of participatory models shaped by local contexts, yet all converge on the necessity of engaging all stakeholders citizens, the informal sector, civil society, and the private sector in the formulation, implementation, and evaluation of waste-management strategies.

For Algeria, the SWOT analysis reveals the existence of promising opportunities (a modern legal framework, emerging green enterprises, digitalization, and latent economic returns), yet the major challenges remain weak community awareness,

the absence of informal-sector integration, and the limited financial autonomy of municipalities a diagnosis corroborated by official figures showing a national recycling rate still below 10%, well short of the 30% target set by the SNGID-2035 strategy (Agence Nationale des Déchets, 2023; Hassaine & Abrika, 2024).

As noted in the Methodology section, these conclusions rest on documentary and secondary-source analysis rather than on original fieldwork, and should accordingly be read as an evidence-based diagnostic rather than as a causally tested model. A natural extension of this study would combine the comparative framework developed here with primary data collection in the Algerian context semi-structured interviews with waste pickers and municipal officials, and household surveys measuring willingness to participate in source separation in order to test empirically which of the mechanisms identified in Section 3 are most transferable, and under what conditions, to Algerian municipalities.

2 Lessons Learned and Recommendations for the Algerian Context

Drawing on the leading international experiences, the study derives the following set of strategic lessons and recommendations for Algeria:

- Launching a national programme to enumerate and organize waste pickers into legally recognized formal cooperatives, providing training and social protection and involving them in the formulation of local policies (drawing on the Latin American model);
- Building a phased national strategy for environmental awareness that targets long-term behavioural change through partnerships with environmental associations, neighbourhood committees, and educational institutions,

alongside the adoption of gradual financial incentives (pay-as-you-throw) in major urban areas (drawing on the European model);

- Establishing a national circular-economy fund, financed by environmental fees and fines, to provide concessional loans for green start-ups and support cooperatives, thereby addressing the problem of local financing; and, further, developing an integrated national digital platform linking waste pickers with processing plants on one hand, and citizens with collection and awareness services on the other, incorporating artificial-intelligence applications to track waste flows (drawing on the Asian model);
- Encouraging partnerships among municipalities, the private sector, and universities to develop innovative local solutions for waste valorization (such as producing organic fertilizers and environmentally friendly building materials), together with clear tax facilities for investors;
- Adopting participatory planning at the local level through the establishment of municipal circular-economy committees bringing together representatives of all stakeholders, to ensure contextual relevance and social acceptance of the proposed solutions.

Ultimately, the success of the transition towards a circular economy in Algeria does not lie in replicating any single experience, but rather in building an integrated model that combines social inclusion, community awareness, and technological innovation, while respecting local particularities and building on available potential towards a vision that is ambitious yet realistic.

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