

Dynamics of Green Entrepreneurship in Waste Management Cooperatives: A SWOT Analysis and Empirical Approach in the Marrakech-Safi Region

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Abstract: Faced with growing environmental challenges, green entrepreneurship has emerged as a key solution for promoting sustainable waste management. In the Marrakech-Safi region, recycling cooperatives play a crucial role in structuring the circular economy, reducing ecological impact, and creating socio-economic opportunities for local populations. However, their development is hindered by economic, institutional, and technical constraints. This study aims to identify the factors that facilitate the adoption of sustainable practices by recycling cooperatives, as well as the obstacles they encounter. A mixed-method approach was adopted, combining questionnaires administered to 15 cooperatives across different provinces in the region and in-depth interviews with their leaders and members. The data analysis involved validity and reliability tests, an analysis of variance (ANOVA), and the Relative Importance Index (RII) method. A SWOT analysis was also conducted to assess strengths, weaknesses, opportunities, and threats. The findings reveal that while cooperatives have generally integrated waste sorting practices, they struggle to implement advanced recycling techniques. The main challenges identified include a lack of funding, the absence of an incentive regulatory framework, and insufficient training. Leaders also highlight internal management difficulties, while members point to a lack of resources and technical support. Based on these insights, strategies are proposed, such as the implementation of tailored financing mechanisms, regulatory improvements, and citizen awareness initiatives. These findings provide strategic recommendations to strengthen the role of recycling cooperatives in the transition towards a sustainable circular economy.

Keywords: *Green Entrepreneurship, Sustainable Waste Management, Recycling Cooperatives, SWOT Analysis.*

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I. INTRODUCTION

Sustainable waste management has become a central environmental and socio-economic issue, particularly in developing countries where collection and treatment infrastructures remain limited. According to the United Nations Environment Programme (UNEP, 2021), more than 2 billion tons of solid waste are generated annually worldwide, but only a fraction is effectively recycled or valorized. This waste management deficit contributes to ecosystem pollution, resource depletion, and the social exclusion of informal waste sector workers (Hoorweg & Bhada-Tata, 2012). The Marrakech-Safi region, generating over 1,200 tons of waste daily with a recycling rate below 10%, exemplifies these structural challenges (Moroccan Ministry of Environment, 2022).

In response to these issues, green entrepreneurship has emerged as an integrated solution that balances economic growth and environmental sustainability (Cohen & Winn, 2007). In this context, waste management cooperatives have become key players in the circular economy, providing essential services such as waste collection, sorting, recycling, and valorization (Nzeadibe & Ajaero, 2010). Beyond mitigating environmental impacts, these cooperatives create employment opportunities and promote social inclusion, particularly for informal waste collectors and marginalized populations (Defourny & Nyssens, 2017).

However, these cooperatives face structural and economic constraints that hinder their expansion and efficiency. Key challenges include limited access to funding, the absence of an incentive regulatory framework, and technical and organizational constraints that impede their

development (Dahmen, 2023). Additionally, they must contend with competition from the informal sector, fluctuating market prices for recycled materials, and insufficient institutional support (Wilson & al (2006).

This study aims to examine the factors influencing the resilience and performance of waste management cooperatives in the Marrakech-Safi region. To achieve this, a SWOT analysis will be used to assess their strengths, weaknesses, opportunities, and threats (Weihrich, 1982). Additionally, quantitative methods such as Analysis of Variance (ANOVA) and the Relative Importance Index (RII) will be employed to measure the impact of the identified obstacles and develop strategic recommendations (Sodhi, Harsimran & Singh, Doordarshi & Singh, Bikram Jit. (2020).

➤ *Thus, this Study Addresses the Following Research Question:*

In a context marked by economic, institutional, and technical constraints, how can waste management cooperatives maximize their impact and become key players in green entrepreneurship and sustainable waste management in the Marrakech-Safi region?

By providing an empirical and strategic analysis, this research seeks to contribute to the literature on the circular economy and to formulate practical recommendations for policymakers and local stakeholders.

II. LITERATURE REVIEW

A. Theoretical Framework: Foundations of Green Entrepreneurship and the Circular Economy

Green entrepreneurship is defined as the creation and development of businesses that have a positive environmental impact by reducing resource consumption and promoting sustainable practices (Schaltegger & Wagner, 2011).

It is rooted in Schumpeter's (1934) theory of creative destruction, which posits that innovation drives economic change, and the theory of entrepreneurial opportunities (Cohen & Winn, 2007), which explains how green entrepreneurs identify and exploit market imperfections to transform ecological challenges into business opportunities.

From an economic perspective, green entrepreneurship aligns with the circular economy theory (Kirchherr et al., 2017). This concept aims to close production loops by minimizing waste through recycling, reuse, and material recovery. At the same time, stakeholder theory (Freeman, 1984) emphasizes the importance of involving various actors—governments, citizens, and businesses—to ensure the long-term viability of recycling initiatives.

➤ *Organizational Models and the Role of Waste Management Cooperatives in the Green Economy*

Waste management cooperatives provide a practical application of these theories by offering a collective approach to urban waste management. According to Defourny and Nyssens (2017), these cooperatives operate at

the intersection of social entrepreneurship and the circular economy, ensuring democratic governance and equitable income distribution. Their key objectives include:

- Improving the socio-economic conditions of informal waste collectors.
- Integrating circular economy principles into waste management.
- Professionalizing waste collection and recycling activities.

This model aligns with Ostrom's (1990) common-pool resource theory, which highlights the need for local and participatory governance in managing environmental and urban resources.

B. Empirical Framework: Applied Research on Waste Management Cooperatives

Empirical studies on waste management cooperatives yield contrasting results depending on the economic and institutional context.

➤ *Environmental and Economic Benefits of Cooperatives*

Research shows that recycling cooperatives significantly improve waste management efficiency and contribute to the circular economy. El Fadel et al. (2018) analyzed the impact of recycling cooperatives in Lebanon and found that they reduce landfill waste by 40% to 60% while creating local economic opportunities.

In Africa, Nzeadibe and Ajaero (2010) examined waste cooperative governance models in urban areas.

Their findings revealed that integrating informal workers into cooperatives increases their income by 25% to 50% compared to those operating independently.

➤ *Constraints and Challenges Facing Recycling Cooperatives*

Despite these positive outcomes, several empirical studies highlight structural challenges that cooperatives encounter.

- *Lack of Funding*
- ✓ Dahmen (2023) emphasizes that limited financial access is a major obstacle to modernizing sorting and recycling infrastructure.
- ✓ Cooperatives often struggle to secure government subsidies due to their hybrid status (between business and nonprofit organization).
- *Lack of Incentive Regulatory Framework*
- ✓ Hall et al. (2010) found that in many developing countries, public policies do not officially recognize recycling cooperatives.

- ✓ Meidiana, & Gamse. (2010). study in Indonesia showed that only 30% of cooperatives have official access to municipal sorting centers.

- *Competition from the Informal Sector*

- ✓ Nzeadibe and Ajaero (2010) report that informal waste collectors dominate recyclable material collection, limiting cooperatives' access to raw materials.
- ✓ Dahmen (2023) highlights that unregulated waste collection practices destabilize the recycling market, reducing the profitability of formal cooperatives.

- *Case Studies and Successful Initiatives*

- *Some Successful Experiences Illustrate how Cooperatives can Overcome these Obstacles:*

- *Brazil: The "Catadores" Model*

- ✓ Brazil is among the few countries that have integrated informal waste collectors into national environmental policies. Lima Cano, Nathalia & Mancini, Sandro. (2017) et Kirchherr et al. (2017) report that over 60% of recycled materials in Brazil come from cooperatives.

- ✓ Lima Cano, Nathalia & Mancini, Sandro. (2017). found that this model has helped reduce municipal waste management costs by 25%.

- *India: The SWaCH Initiative*

- ✓ SWACH, a cooperative in Pune, has provided stable employment and social security to over 3,500 informal waste collectors Estrada, Mauricio & Galvin, Madeleine & Maassen, Anne & Hörschelmann, Kathrin. (2023).

These empirical findings suggest that the institutionalization and legal recognition of cooperatives are critical levers for maximizing their impact.

III. METHODOLOGY

A. Study Variables

This study examines the factors promoting the adoption of sustainable practices by waste management cooperatives and identifies the obstacles to their development. two categories of variables are analyzed:

Variables related to sustainable waste management: these variables measure the adoption of practices such as sorting, recycling, and waste recovery.

Variables related to obstacles to sustainable management: these variables identify the main economic, institutional, and technical challenges faced by cooperatives.

Table 1 Variables Related to Sustainable Waste Management

Variable	Description
X1	Adoption of waste sorting practices
X2	Use of recycled materials
X3	Implementation of environmental awareness programs
X4	Management of hazardous waste (B3 waste)
X5	Reduction of energy and water consumption

Source: Own Elaboration

Table 2 Variables Related to Obstacles to Sustainable Management

Variable	Description
Y1	Lack of funding
Y2	Absence of an incentive regulatory framework
Y3	Lack of training and technical skills
Y4	Competition from the informal sector
Y5	Difficulties in accessing recycling technologies

Source: Own Elaboration.

B. Population and Sample

The study focuses on a purposive sample of 15 waste management cooperatives operating in the Marrakech-Safi region and its surrounding provinces. The selection was based on specific criteria:

- Minimum of three years of operation.
- Primary activity centered on solid waste collection and treatment.
- Community engagement and formal organizational structure.
- *The Following Table Presents the Geographical Distribution of the Cooperatives:*

Table 3 Distribution of Cooperatives by Province.

Province	Number of Cooperatives	Percentage (%)
Marrakech	4	26.7
Kelaa des Sraghna	1	6.7
Essaouira	2	13.3
Chichaoua	2	13.3
Yousseoufia	1	6.7
Rhamna	1	6.7
Safi	2	13.3
El Haouz	2	13.3
Total	15	100

Source: Own Elaboration based on Field Data.

C. Data Collection Techniques

The study relies on a mixed-method approach combining quantitative and qualitative data obtained through:

- Structured questionnaires distributed to the leaders and members of the cooperatives.
- Semi-structured interviews conducted with experts and institutional stakeholders.

➤ Questionnaires

The questionnaires were designed to collect data on:

- Profile of the cooperatives: Size, years of operation, sector of activity.
- Waste management practices : Sorting, recycling, valorization.
- Challenges encountered: Financing, regulations, training.

• Responses were Measured on a Likert Scale (1 to 5):

- ✓ 1 = Strongly disagree.
- ✓ 2 = Disagree.
- ✓ 3 = Neutral.
- ✓ 4 = Agree.
- ✓ 5 = Strongly agree.

➤ Interviews

Semi-structured interviews were conducted with 15 experts and institutional stakeholders, focusing on three main themes:

- Perception of sustainable waste management challenges.
- Identification of obstacles hindering the expansion of cooperatives.
- Proposals for strategies to improve the performance of cooperatives.

D. Data Analysis Methods

➤ Statistical Tests:

Table 4 Statistical Tests Applied in the Study

Test	Purpose
Validity test	To verify the relevance and appropriateness of the survey questions, ensuring they accurately measure the intended constructs.
Reliability test	To assess the internal consistency of responses using Cronbach's alpha, ensuring the survey items measure the same underlying concept.
Normality test	To check the distribution of data using statistical methods such as the Shapiro-Wilk test, determining if parametric analyses are appropriate.
Analysis of variance (ANOVA)	To compare waste management practices among cooperatives of different sizes and locations, identifying significant differences across groups.

Source: Own elaboration based on field data.

➤ Relative Importance Index (RII)

The Relative Importance Index (RII) is used to rank perceived obstacles by the cooperatives.

$$RII = \frac{\sum_{i=1}^n w_i \cdot x_i}{N \cdot 5} \quad (1)$$

where:

- w_i = Weight assigned to each obstacle (ranging from 1 to 5).
- x_i = Frequency of each response.
- N = Total number of respondents.

➤ SWOT Analysis

A SWOT analysis was conducted to identify the strengths, weaknesses, opportunities, and threats affecting waste management cooperatives. This strategic tool provides a solid foundation for formulating actionable recommendations (Wehrich, 1982).

IV. RESULTS AND DISCUSSION

➤ Data Collection

Data was collected from 15 waste management cooperatives across different provinces in the Marrakech-Safi region. The respondents included both cooperative leaders and regular members, providing a comprehensive perspective on waste management practices and the challenges encountered.

Table 5 Profile of Respondents

Characteristic	Category	Number	Percentage (%)
Education Level	Secondary	2	13.33
	Technician Diploma (Bac+2)	2	13.33
	Bachelor's Degree (Bac+3)	10	66.67
	Master's Degree (Bac+5)	1	6.67
Work Experience	1-5 years	4	26.67
	6-10 years	6	40.00
	11-15 years	2	13.33
	16-20 years	1	6.67
	More than 20 years	2	13.33

Source: Own Elaboration Based on Field Data.

➤ Validity and Reliability Tests

• Validity Test

The validity test was conducted using the Pearson Product-Moment Correlation Method. Variables were considered valid if the calculated r-value exceeded the critical r-table value (0.380 at a 1% significance level).

- ✓ For variables related to sustainable waste management, one variable (X15) was excluded as it did not meet the validity threshold.
- ✓ For variables related to obstacles, all variables (Y1 to Y12) were validated.

• Reliability Test

The reliability test was conducted using Cronbach's alpha coefficient. A score above 0.6 indicates good reliability.

Table 6 Reliability Test Results

Measurement Tool	Cronbach's Alpha	Number of Items
Sustainable Waste Management	0.809	14
Obstacles to Sustainable Management	0.850	12

Source: Own Elaboration based on Field Data.

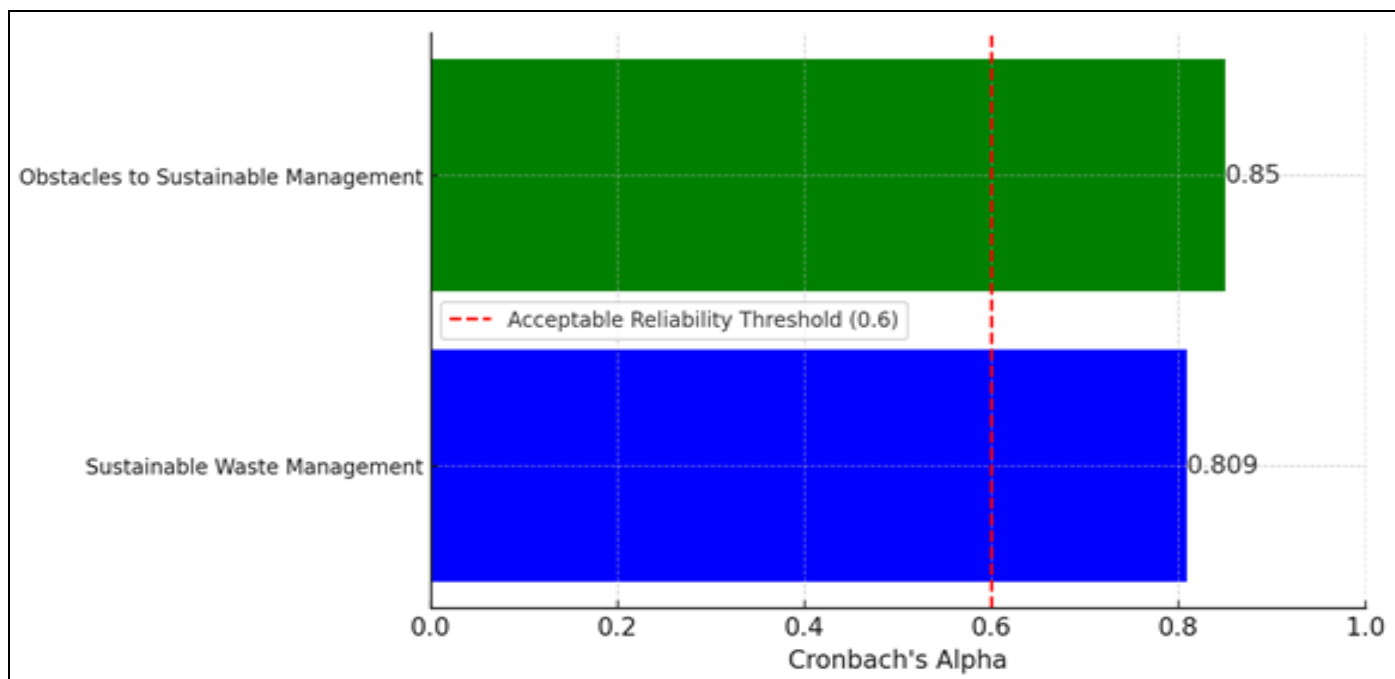


Fig 1 Reliability Test Results (Cronbach's Alpha)

Source: Own Elaboration based on Field Data.

The results indicate that both measurement tools are reliable, with scores well above the 0.6 threshold.

➤ Normality Test

The normality test was conducted using the Shapiro-Wilk method, which is suitable for small sample sizes (less than 50 respondents). The results indicate that the data are normally distributed for the five groups of cooperatives analyzed.

Table 7 Normality Test Results (Group Analysis).

Cooperative Group	Shapiro-Wilk Statistic	p-value
Group 1 (Marrakech - 4 cooperatives)	0.989	0.977
Group 2 (Kelaa des Sraghna - 1 cooperative)	0.915	0.163
Group 3 (Essaouira - 3 cooperatives)	0.974	0.899
Group 4 (Chichaoua - 2 cooperatives)	0.969	0.817
Group 5 (Safi - 2 cooperatives)	0.940	0.655
Group 6 (El Haouz - 2 cooperatives)	0.951	0.712
Group 7 (Rhamna - 1 cooperative)	0.962	0.785

Source: Own Elaboration based on Field Data.

The results indicate that most groups have a p-value greater than 0.05, confirming that their data follow a normal distribution. However, the groups of Kelaa des Sraghna ($p = 0.163$) and Safi ($p = 0.655$) show borderline values, which may require further testing or adjustments in data interpretation.

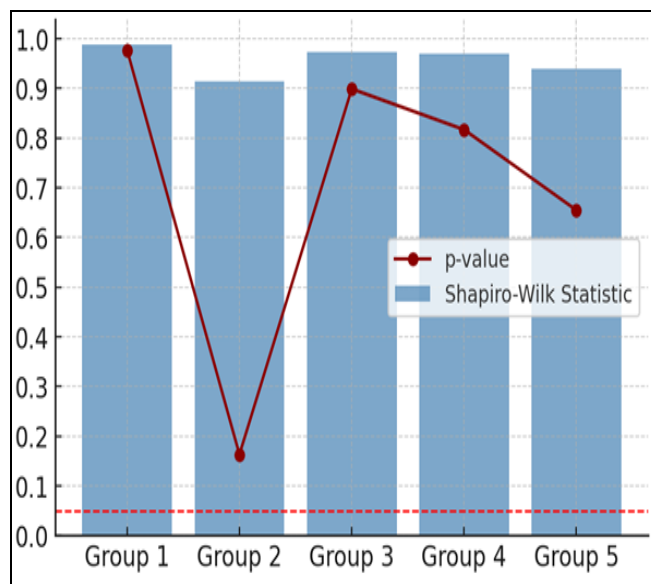


Fig 2 Shapiro-Wilk Normality Test Results for Cooperative Groups

Source: Own elaboration based on field data.

➤ Analysis of Variance (ANOVA)

An Analysis of Variance (ANOVA) was conducted to compare sustainable waste management practices across the seven groups of cooperatives. The results indicate that the differences between the groups are not statistically significant ($p > 0.05$), suggesting that the practices are relatively homogeneous.

Table 8 ANOVA Results

Group	Mean	Standard Deviation	p-value
Group 1 (Marrakech, 4 cooperatives)	4.31	0.298	0.877
Group 2 (Kelaa des Sraghna, 1 cooperative)	4.04	0.406	0.710
Group 3 (Essaouira, 2 cooperatives)	4.23	0.171	0.074
Group 4 (Chichaoua, 2 cooperatives)	4.11	0.504	0.701
Group 5 (El Haouz, 2 cooperatives)	4.11	0.345	0.155
Group 6 (Rhamna, 1 cooperative)	4.09	0.389	0.265
Group 7 (Safi, 2 cooperatives)	4.15	0.298	0.542

Source: Own Elaboration based on Field Data.

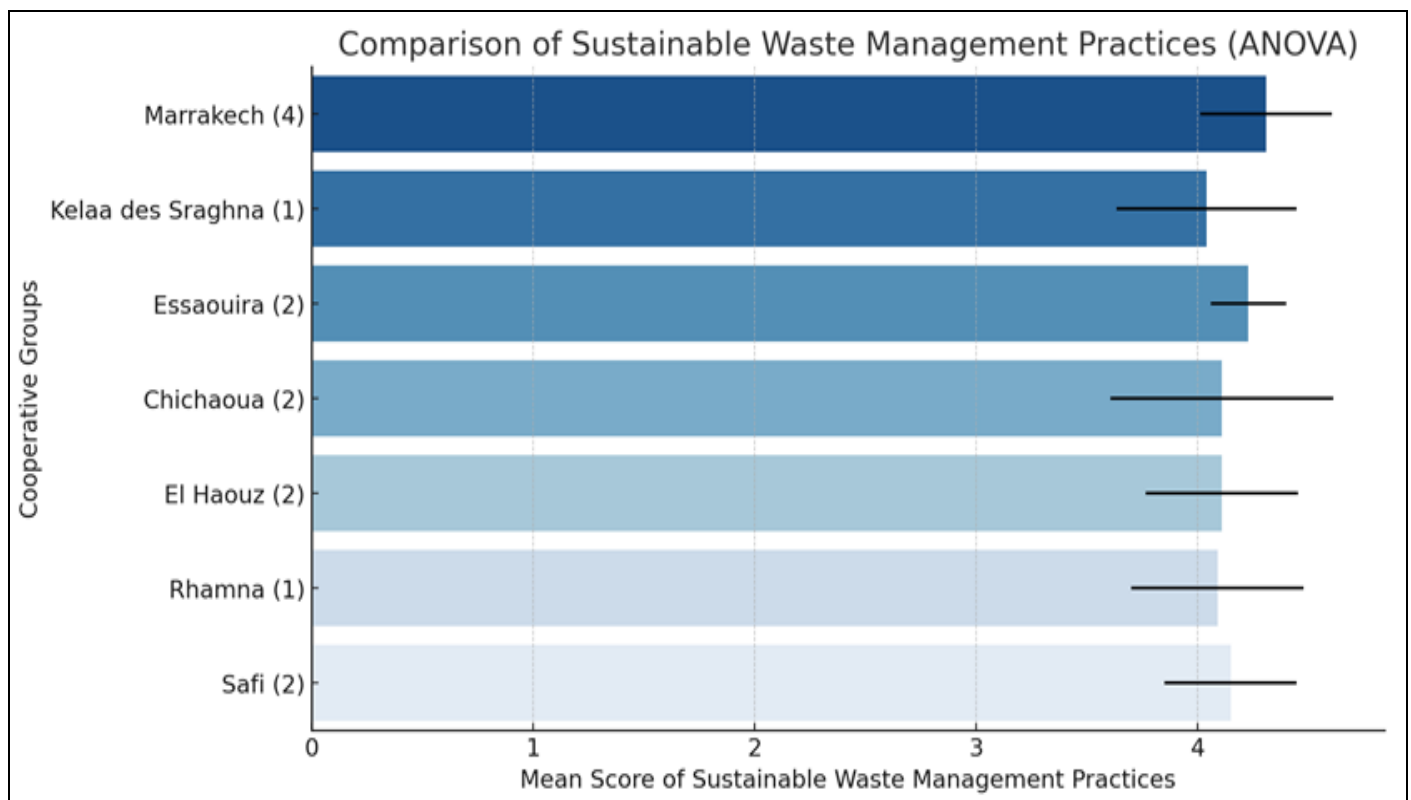


Fig 3 Comparison of Sustainable Waste Management Practices (ANOVA).

Source: Own elaboration based on field data.

➤ *Relative Importance Index (RII)*

The Relative Importance Index (RII) was used to rank the obstacles to sustainable waste management. The results are presented in the following table:

Table 9 RII Analysis Results

Obstacle	RII	Rank
Informal sector competition	0.76	1
Lack of funding	0.74	2
Absence of a regulatory framework	0.72	3
Lack of training	0.68	4
Limited access to recycling technologies	0.64	5

Source: Own Elaboration based on Field Data.

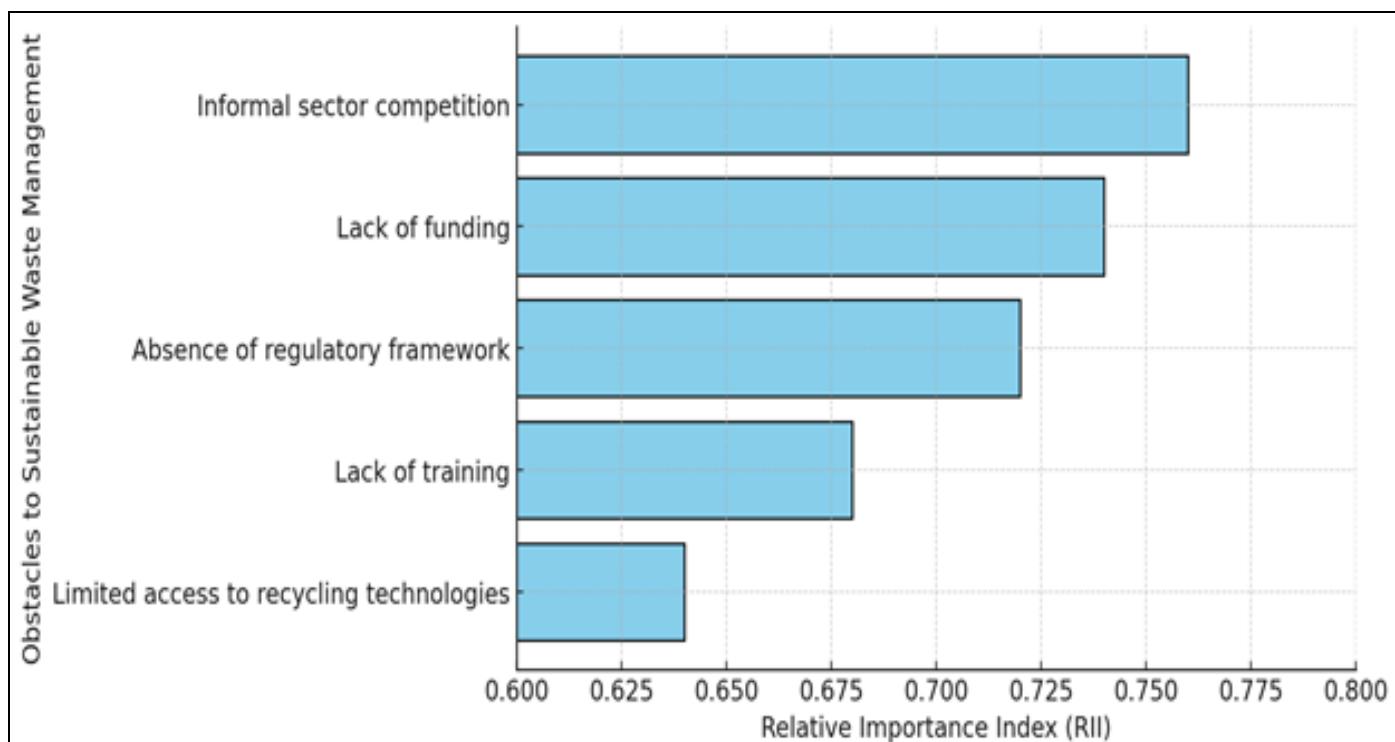


Fig 4 Ranking of Obstacles to Sustainable Waste Management Based on the Relative Importance Index (RII).

Source: Own elaboration based on field data.

➤ *SWOT Analysis of Waste Management Cooperatives in the Marrakech-Safi Region.*

The SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis is a crucial strategic tool for identifying the internal strengths and weaknesses of waste management cooperatives, as well as the opportunities and threats from their external environment. This analysis helps guide public policies and development strategies to maximize the contribution of cooperatives to the circular economy and sustainable waste management.

• *Strengths: Internal Advantages of Waste Management Cooperatives*

Waste management cooperatives have several strengths that enhance their ability to promote sustainable practices and develop an economic model based on the circular economy.

✓ *Adoption of Effective Waste Sorting and Recycling Practices*

- Most cooperatives have implemented waste sorting systems to optimize the recovery of recyclable materials.
- The establishment of community sorting centers improves the efficiency of solid waste management.

✓ *Commitment to Raising awareness among Members and Local Communities*

- Cooperatives regularly organize environmental awareness campaigns to encourage household waste sorting.
- Community involvement strengthens the culture of recycling and waste reduction.

✓ *Strong Local Anchoring and Community Mobilization*

- Cooperatives benefit from a strong territorial presence, facilitating household and institutional engagement in waste management initiatives.
- The integration of informal waste pickers into cooperatives provides them with social and professional recognition.

✓ *Use of Appropriate and Accessible Technologies*

- The adoption of low-cost recycling technologies ensures economic viability despite limited investments.
- Some cooperatives use composting methods and biodegradable waste-to-energy conversion.

• *Weaknesses: Structural and Organizational Constraints.*

Despite their potential, waste management cooperatives face several internal challenges that limit their growth and impact.

✓ *Lack of Financial and Technical Resources*

- Limited access to funding remains a major obstacle to purchasing equipment and expanding operations.
- The absence of modern machinery restricts the efficiency of recycling processes.

✓ *Deficit in Training and Technical Skills*

- Most cooperative members lack advanced training in recycling technologies and waste management.
- Deficiencies in administrative and financial management weaken the financial sustainability of some structures.

✓ *Inefficient Internal Management*

- Governance and internal structuring challenges are common due to the lack of clear regulatory frameworks governing cooperative operations.
- Frequent turnover among members and leaders hampers the continuity of initiatives.

✓ *Dependence on Public Subsidies and Absence of Autonomous Economic Models*

- Many cooperatives rely heavily on public subsidies and projects funded by international organizations, making them vulnerable to government budget fluctuations.

• *Opportunities: Favorable External Factors*

The evolution of environmental policies and the growing momentum of the circular economy present several opportunities that cooperatives can leverage.

✓ *Favorable Public Policies and Institutional Initiatives*

- The Moroccan government has launched several programs to promote the circular economy and support local waste management initiatives.
- The United Nations' 2030 Agenda and Sustainable Development Goals (SDGs) encourage the development of sustainable waste management practices.

✓ *Increasing Demand for Recycled Materials*

- The rise in raw material prices encourages industries to turn to recycled materials, creating a promising market for cooperatives.

✓ *Strategic Partnerships with Private Companies and NGOs*

- Developing collaborations between cooperatives and large companies ensures a stable market for recycled materials.
- Environmental NGOs play a key role in providing technical support and training to cooperative members.

✓ *Growing Public awareness of Environmental Issues*

- The rise of environmental campaigns and regulations on waste management strengthens public adherence to local recycling initiatives.

• *Threats : External Challenges.*

Certain external threats may compromise the viability of cooperatives and their ability to integrate fully into the circular economy.

- ✓ Increased competition from the informal sector
- ✓ The informal recycling sector captures a significant portion of recyclable materials, limiting cooperatives' access to raw materials.
- ✓ Fluctuations in recycled material prices
- The high volatility of recycled material prices reduces the profitability of collection and sorting activities.
- ✓ Unpredictable regulatory changes.
- ✓ The absence of a stable regulatory framework creates uncertainty for cooperatives and discourages investment in the sector.
- ✓ Lack of institutional support and bureaucratic obstacles
- ✓ Insufficient public support mechanisms make it difficult for cooperatives to obtain necessary permits and financial assistance.

• *SWOT Analysis Summary.*

The following table summarizes the key elements of the SWOT analysis:

Table 10 SWOT Analysis

Strengths	Weaknesses
Adoption of sorting and recycling practices	Lack of financial resources
Awareness campaigns for members and communities	Deficit in training and technical skills
Strong local engagement and community mobilization	Inefficient internal management
Use of simple and accessible recycling technologies	Dependence on public subsidies
Opportunities	Threats
Favorable public policies	Competition from the informal sector
Increasing demand for recycled materials	Fluctuations in recycled material prices
Partnerships with private companies	Unpredictable regulatory changes
Growing public awareness	Lack of institutional support

Source: Own Elaboration based on Field Data.

• *Graphical Representation of SWOT Analysis.*

To visually summarize the SWOT analysis, the figure below presents a strategic matrix of the identified key factors.

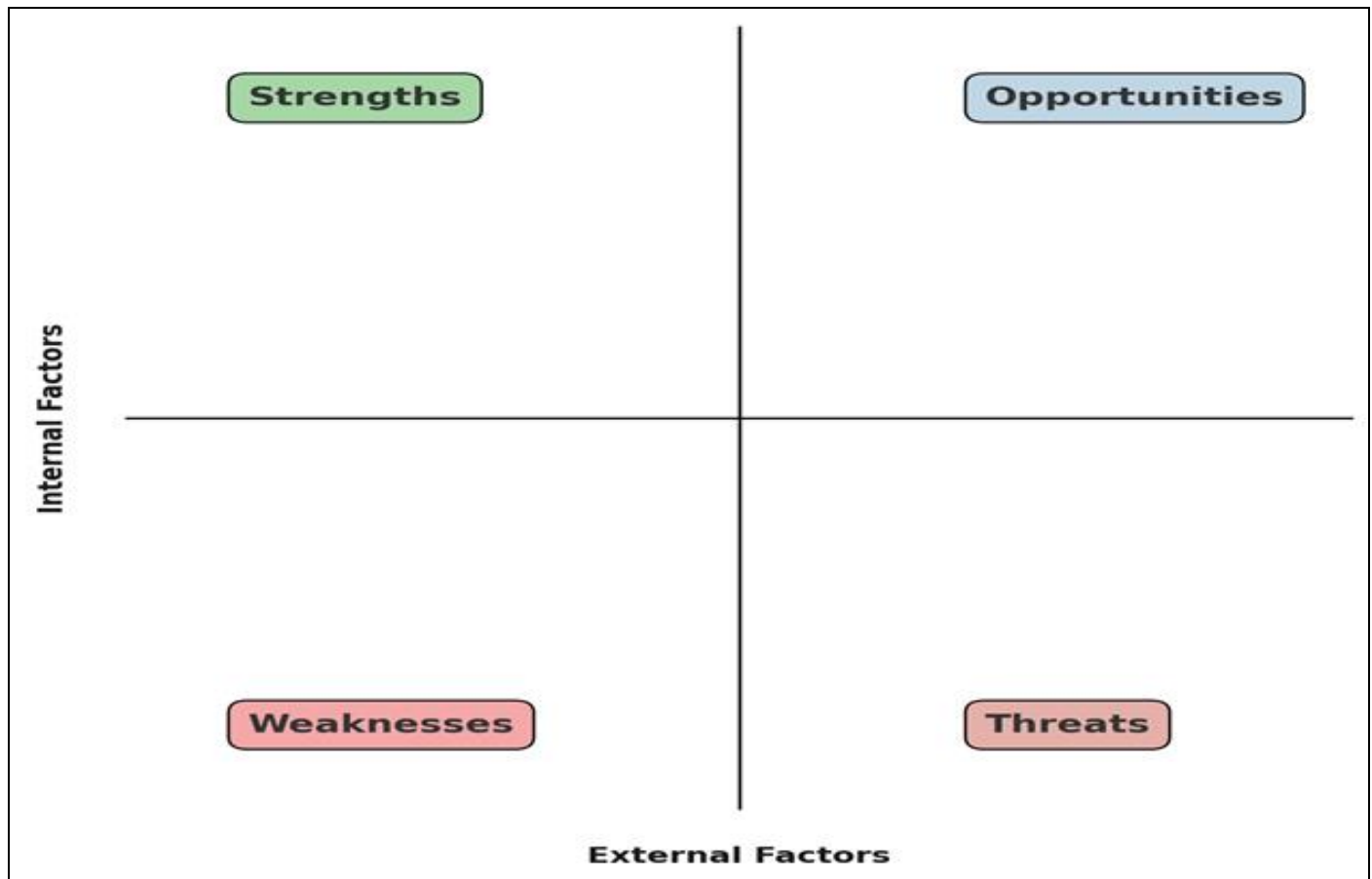


Fig 5 Matrice SWOT Des Coopératives De Gestion Des Déchets

Source: Own Elaboration based on Field Data.

V. CONCLUSION GENERALE

This study highlights the pivotal role of waste management cooperatives in promoting green entrepreneurship and sustainable waste management within the Marrakech-Safi region. By integrating principles of the circular economy, these cooperatives contribute to waste reduction, resource recovery, and socio-economic inclusion. The findings reveal that while cooperatives have successfully implemented basic waste sorting and recycling practices, they face significant structural, economic, and institutional challenges.

The SWOT analysis identifies key strengths, such as strong community engagement and the adoption of low-cost recycling techniques, but also exposes weaknesses, including financial constraints, limited technical expertise, and inefficient internal governance. Opportunities such as favorable public policies, increased demand for recycled materials, and partnerships with private stakeholders could enhance cooperative performance. However, threats such as competition from the informal sector, fluctuating market prices, and regulatory instability remain pressing challenges.

Statistical analyses, including ANOVA and the Relative Importance Index (RII), confirm that the main barriers to

cooperative efficiency include lack of funding (RII = 0.74), absence of an enabling regulatory framework (RII = 0.72), and competition from informal waste collectors (RII = 0.76). These findings emphasize the urgent need for policy interventions, technical capacity building, and financial support mechanisms to enhance cooperative resilience and effectiveness.

To maximize the impact of waste management cooperatives and ensure their long-term sustainability, the following strategic actions are proposed:

➤ *Strengthening Financial Support Mechanisms*

- Facilitate access to microfinance and impact investment funds.
- Encourage public-private partnerships to secure long-term financial stability.

➤ *Enhancing Technical and Managerial Capacities*

- Develop training programs on advanced recycling techniques, cooperative management, and financial sustainability.
- Introduce mentorship and knowledge-sharing initiatives with established recycling enterprises.

➤ *Regulatory and Institutional Reforms*

- Establish legal recognition and regulatory incentives for cooperatives in the waste management sector.
- Promote formalization of the informal waste sector and integrate informal waste collectors into cooperative structures.

➤ *Market Development and Awareness Campaigns*

- Support cooperatives in accessing new markets for recycled materials.
- Increase citizen engagement through awareness campaigns on waste sorting and recycling.

While this study provides valuable insights into the operational and strategic dynamics of waste management cooperatives, further research is needed to:

- Assess the long-term socio-economic impact of cooperatives on waste pickers and marginalized communities.
- Evaluate the scalability and replicability of successful cooperative models in other regions.
- Investigate the potential of digital and technological innovations in optimizing cooperative waste management processes.

Waste management cooperatives represent a viable and scalable model for sustainable development, yet their success depends on multi-stakeholder collaboration, institutional support, and innovation-driven approaches. By addressing financial, regulatory, and technical challenges, these cooperatives can evolve into key actors in the transition towards a circular and green economy, aligning with both national environmental policies and global sustainability goals.

This study serves as a foundation for policymakers, researchers, and development organizations to design evidence-based strategies that enhance cooperative resilience and maximize their contributions to sustainable waste management.

REFERENCES

- [1]. Cohen, B., & Winn, M. I. (2007). Market imperfections, opportunity and sustainable entrepreneurship. *Journal of Business Venturing*, 22(1), 29-49. <https://doi.org/10.1016/j.jbusvent.2004.12.001>
- [2]. Dahmen, P. (2023). Organizational resilience as a key property of enterprise risk management in response to novel and severe crisis events. *Risk Management and Insurance Review*, 26(2), 203-245. <https://doi.org/10.1111/rmir.12250>
- [3]. Defourny, J., & Nyssens, M. (2017). Fundamentals for an international typology of social enterprise models. *Voluntas: International Journal of Voluntary and Nonprofit Organizations*, 28(6), 2469-2497. <https://doi.org/10.1007/s11266-017-9884-7>
- [4]. Estrada, Mauricio, Galvin, Madeleine, Maassen, Anne, & Hörschelmann, Kathrin. (2023). Catalysing urban transformation through women's empowerment in cooperative waste management: the SWaCH initiative in Pune, India. *Local Environment*, 28, 852-866. <https://doi.org/10.1080/13549839.2022.2090532>
- [5]. Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139192675>
- [6]. Hall, J. K., Daneke, G. A., & Lenox, M. J. (2010). Sustainable development and entrepreneurship: Past contributions and future directions. *Journal of Business Venturing*, 25(5), 439-448. <https://doi.org/10.1016/j.jbusvent.2010.01.002>
- [7]. Hoorweg, Dan, & Bhada-Tata, Perinaz. (2012). What a waste: a global review of solid waste management. *Urban Dev Ser Knowl Pap*, 15, 87-88.
- [8]. Kirchherr, J., Reike, D., & Hekkert, M. (2017). Conceptualizing the circular economy: An analysis of 114 definitions. *Resources, Conservation and Recycling*, 127, 221-232. <https://doi.org/10.1016/j.resconrec.2017.09.005>
- [9]. Lima Cano, Nathalia, & Mancini, Sandro. (2017). Integration of informal recycling sector in Brazil and the case of Sorocaba City. *Waste Management & Research*, 35, 0734242X1770805. <https://doi.org/10.1177/0734242X17708050>
- [10]. Meidiana, Christia, & Gamse, Thomas. (2010). Development of Waste Management Practices in Indonesia. *European Journal of Scientific Research*, 40.
- [11]. Nzeadibe, Chidi, & Ajaero, Chukwuedozie. (2010). Informal waste recycling and urban governance in Nigeria: Some experiences and policy implications.
- [12]. Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press. <https://doi.org/10.1017/CBO9780511807763>
- [13]. Schaltegger, S., & Wagner, M. (2011). Sustainable entrepreneurship and sustainability innovation: Categories and interactions. *Business Strategy and the Environment*, 20(4), 222-237. <https://doi.org/10.1002/bse.682>
- [14]. Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. Harvard University Press.
- [15]. Sodhi, Harsimran, Singh, Doordarshi, & Singh, Bikram Jit. (2020). SWOT analysis of waste management techniques quantitatively. *International Journal of Advanced Operations Management*, 12, 103-121. <https://doi.org/10.1504/IJAOM.2020.10030214>
- [16]. United Nations Environment Programme (UNEP). (2021). *Global Waste Management Outlook 2021*. United Nations. <https://www.unep.org/resources/report/global-waste-management-outlook-2021>

- [17]. Weihrich, H. (1982). The TOWS matrix—A tool for situational analysis. *Long Range Planning*, 15(2), 54-66. [https://doi.org/10.1016/0024-6301\(82\)90120-0](https://doi.org/10.1016/0024-6301(82)90120-0)
- [18]. Wilson, David, Velis, Costas, & Cheeseman, C. R. (2006). The Role of Informal Sector Recycling in Waste Management in Developing Countries. *Habitat International*, 30, 797-808. <https://doi.org/10.1016/j.habitatint.2005.09.005>