

CITIZENS' PERSPECTIVE ON SOLID WASTE MANAGEMENT AND SUSTAINABLE USE IN GROCERY STORES

CITIZENS' PERSPECTIVE ON SOLID WASTE MANAGEMENT AND SUSTAINABLE USE IN GROCERY STORES OPERATING UNDER A CIRCULAR ECONOMY MODEL

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Abstract -- Over the past few years, solid waste generation in the city of Chetumal has increased, leading to significant environmental challenges. Grocery stores, as an integral part of residents' daily lives, are perceived as major sources of waste generation and accumulation—primarily plastic packaging, cardboard, and glass, among other materials—resulting from direct sales to consumers as well as the supply of merchandise. Furthermore, this situation is exacerbated by the fact that the stores lack strategies to reduce, reuse, and recycle waste, underscoring the need to promote training programs, incentives, and policies that encourage the adoption of more sustainable models. Therefore, this study analyzes the possibility of grocery stores generating economic resources through waste management and the production of sustainable materials, while examining the attitudes and perceptions of local residents in the Caribe neighborhood of Chetumal regarding this issue.

Keywords: grocery stores, waste, circular economy, reduction, solid waste.

Abstract -- In recent years, the generation of solid waste in the city of Chetumal has increased, posing major environmental challenges. Grocery stores, as part of residents' daily lives, are perceived as significant sources of waste generation and accumulation—primarily plastic packaging, cardboard, and glass, among others—produced both through direct sales to consumers and the restocking of merchandise. This situation is further exacerbated by the lack of strategies in these stores to reduce, reuse, and recycle waste, highlighting the need to promote training programs, incentives, and policies that

encourage the adoption of more sustainable models. Therefore, this study analyzes the possibility that grocery stores can generate economic resources through waste management and the production of sustainable materials, while examining the attitudes and perceptions of local residents of the Caribe neighborhood in the city of Chetumal regarding this issue.

Keywords – grocery stores, waste, circular economy, reduction, solid waste.

INTRODUCTION

Ever since humanity began living in primitive communities, villages, or towns, waste has been generated, and this has had an impact on daily life. Throughout the emergence and growth of civilizations, various practices aimed at waste management and disposal began to be implemented.

The Industrial Revolution marked a pivotal stage in which the flow of materials was accelerated, fostering increased production and economic expansion. At the same time, this process spurred urban development, giving rise to a mutual interaction between these two phenomena. This relationship led to the emergence of recycling. The idea was to circulate materials with the aim of providing food and raw materials to the very industries that produced them. Today, a single sector—plastic packaging—accounts for nearly 95% of the waste generated, even though these materials have an estimated economic value of between 80 and 120 billion dollars per year, which is lost due to their very short lifespan.

Kirchherr defines the circular economy as: “An economic system based on business models that replace the concept of ‘end of life’ with the reduction, reuse, recycling, and recovery of materials in production, distribution, and consumption processes, thus operating at the micro level (products, companies, consumers), the meso level (eco-industrial parks), and macro levels (city, region, nation, and beyond), with the goal of achieving sustainable development, which involves creating environmental quality, economic prosperity, and social equity, for the benefit of current and future generations.”

The circular economy is conceived as a management strategy aimed at decoupling economic growth from the continuous exploitation of finite natural resources. In contrast to the conventional linear model—centered on the extraction, manufacturing, and subsequent disposal of products—this approach proposes a continuous cycle in which materials and goods are reused and remain in use for as long as possible.

Against the backdrop of global environmental degradation, which has intensified over time, the gradual adoption of more sustainable production and consumption models seeks to strengthen efforts aimed at reducing the exploitation of natural resources and promoting responsible solid waste management, with the goal of recovering materials and extending their life cycle within the framework of the circular economy.

In recent decades, the amount of solid waste generated has grown significantly, establishing itself as a global environmental and social problem. According to a World Bank report, more than 2 billion metric tons of solid waste are generated annually, and if strategic measures are not implemented, this figure is expected to increase by 70% by 2050[1].

How does proper solid waste management contribute to the development of a circular economy in the city of Chetumal, and what are the residents’ views on this matter?

Regarding the question about the perception of residents in the Caribe neighborhood of Chetumal, Quintana Roo, concerning the initiative and the feasibility of using solid waste generated by grocery stores to produce sustainable materials, thereby fostering a circular economy. Currently, there is no company specifically dedicated to waste management; therefore, it is essential to gather citizens’ opinions on this alternative in order to assess the economic and social feasibility of establishing such companies.

This research project focuses on analyzing public acceptance so that companies will take on the

responsibility of producing sustainable materials from solid waste through recycling processes in the city of Chetumal. The initiative seeks to encourage residents to adopt this approach in order to determine whether there is economic and social viability for the private sector—with the assistance of grocery stores—to develop this activity. This initiative is driven by the fact that there is currently no entity dedicated to the management and processing of solid waste in this locality.

The circular economy proposes an innovative approach aimed at minimizing waste production through reduction, reuse, and recycling, promoting the responsible and sustainable use of materials currently considered trash. However, the implementation of this model is closely linked to the knowledge, perceptions, and active involvement of citizens, including both consumers and local store owners.

Therefore, it is necessary to analyze citizens’ perspectives on solid waste management and their willingness to incorporate circular economy strategies into grocery stores in the area. Understanding how they perceive the issue, what practices they currently follow, and how open they are to alternative waste management models will help identify barriers, opportunities, and areas for improvement.

Through online surveys targeting residents who own grocery stores in the Caribe neighborhood of Chetumal, with the aim of gathering their opinions on the proposals presented above, the study will also analyze the possibility of companies partnering with grocery stores to generate economic resources through waste management and the production of sustainable materials.

The study will focus on collecting quantitative data to shed light on the attitudes and perceptions of local residents in the Caribe neighborhood of Chetumal regarding this issue.

DEVELOPMENT

This study takes into account the input of Chetumal residents—specifically those living in the Caribe neighborhood—regarding the use of solid waste for the production of sustainable materials. The study conducted in this research is quantitative and descriptive. Therefore, the survey will be administered online to individuals aged 18 to 65, as this group is considered capable of providing reliable information.

Proper circular waste management involves making use of waste and scraps rather than simply discarding them. This practice focuses on reducing waste to a minimum so that, when a product has reached the end of its useful life, its components remain integrated into the economic system—as much as possible—through recycling processes.

In Mexico, there is a constant increase in solid waste, and the resulting limited capacity to manage it highlights the need to implement a circular economy model. This approach allows waste to be converted into valuable resources, promoting key strategies to reduce pollution and generate economic benefits for the city.

Solid waste management encompasses the set of activities aimed at the collection, separation, transportation, treatment, and final disposal of waste generated by human activities[2]. In Mexico, the increase in urban waste has placed significant pressure on municipal sanitation systems, especially in urban areas where per-capita waste generation continues to rise[3].

Grocery stores, due to their sales volume and proximity to the population, contribute significantly to the production of solid waste such as plastic containers, cans, glass, and cardboard. Because they are part of communities' daily lives, these establishments can become strategic locations for promoting practices such as separation, collection, recycling, or reducing packaging use.

The circular economy offers an alternative to the conventional linear model of production and consumption. Its goal is to keep materials in use through strategies of reduction, reuse, and recycling, thereby reducing waste generation and environmental impact [4].

Conceptual

Municipal solid waste (MSW), formerly known as municipal waste, is defined as "waste generated in residential homes resulting from the disposal of materials used in domestic activities, the products consumed, and their containers, wrappings, or packaging" [5]. Waste originating from any other activity within establishments or on public streets that generates waste with household characteristics, and waste resulting from the cleaning of streets and public places, provided that such waste is not classified by law as waste of another nature," according to the General Law for the Prevention and Comprehensive Management of Waste.

Citizen participation encompasses the actions through which residents engage in decision-making and the implementation of activities that benefit their social and environmental surroundings. On environmental issues, this participation is essential for strengthening community campaigns, improving waste management practices, and fostering a collective environmental culture.

Grocery stores are small-scale commercial establishments that sell basic, everyday consumer goods. Due to their daily operations, they generate waste associated with product packaging and the community's

immediate consumption. Because of their proximity to residents, they represent a strategic location for implementing initiatives such as waste separation, container return programs, and plastic reduction.

Public perception refers to the set of beliefs, opinions, attitudes, and assessments that the population holds regarding a specific issue—in this case, solid waste management. This perception influences people's environmental behavior and their willingness to participate in recycling programs or circular economy initiatives.

References

The following articles and theses are relevant to this research, as they mention and define the need for proper solid waste management.

"Residents' Perceptions of Solid Waste Concessions Granted to Companies for the Production of Sustainable Materials in Chetumal, Quintana Roo"

This study analyzes the rapid growth of solid waste in Chetumal, noting that the city lacks the infrastructure and companies capable of managing it properly or transforming it into sustainable materials, which highlights the need to explore recycling alternatives based on the circular economy. It addresses the importance of solid waste management in Chetumal as an opportunity not only to reduce environmental pollution but also to generate economic benefits through the creation of sustainable materials. Based on surveys conducted in the Miraflores neighborhood, the study concludes that most residents are aware of the positive impacts of recycling and are open to using products made from recycled materials.[6] The study also identifies the feasibility of involving local companies in the solid waste concession to transform waste into sustainable products, thereby promoting a circular economy.[7]

"Household Solid Waste Recovery Center for Recycling"

The Household Solid Waste Recovery Center for Recycling, implemented in Santiago, Chile, is designed as a comprehensive alternative to address the challenges posed by rapid population growth and the sustained increase in household waste production. This situation has had adverse effects on the economic, social, and environmental sectors, primarily due to the overload of conventional final disposal methods and the limited capacity of the infrastructure dedicated to the proper treatment of waste. Given this context, the project focuses on promoting recycling as a key strategy to reduce the amount of waste sent to landfills and, at the same time, harness the economic value of recyclable materials.

The main objective of the study was to promote recycling through the implementation of a specialized facility capable of meeting the country's growing demand for efficient waste management. To this end, a descriptive, non-experimental approach was used, which allowed for a detailed analysis of each of the phases involved in the waste recovery process. These stages include the unloading and initial storage of waste according to type, the separation of materials based on their physical characteristics, the cleaning and drying of the materials, as well as their subsequent shredding and compaction. These activities ensure that the materials are prepared for reuse.

Finally, the processed waste is stored and sold to organizations specializing in recycling, which contributes to the circular economy and generates economic and social benefits. This comprehensive process not only improves the efficiency of household solid waste management but also promotes sustainable practices, reduces environmental pollution, and strengthens social awareness of the importance of recycling as a viable and necessary alternative for sustainable development[8].

“Development of a Solid Waste Management Plan for the Model Food Market in the District of Chulucanas – Piura 2017”

The research focused on developing a strategy for the proper management of solid waste at the model food market in the District of Chulucanas. To this end, a quantitative methodology was employed, characterized by a sequential and evidence-based process. The findings revealed that the municipality lacks a management plan for this waste, which, combined with noncompliance with current regulations, exacerbates the problem. It was determined that the predominant waste is organic in origin, generated mainly by food, fruits, vegetables, fish, and meat, all of which are managed inadequately. In light of this problem, the author emphasizes that implementing an effective proposal for solid waste management would not only optimize its reuse and final disposal but also increase the commitment of local authorities. Furthermore, this strategy would contribute significantly to reducing pollution, promoting a more environmentally friendly environment [9].

Experiences with the Circular Economy in Local Contexts

The circular economy has been progressively incorporated into national policies and community strategies to reduce environmental impact. The Ellen MacArthur Foundation emphasizes that the transition to this model requires the participation of all actors in the consumption chain, from producers to retailers and consumers [10].

In Mexico, various localities have implemented recycling and container return programs in small businesses, achieving a significant reduction in the amount of waste sent to landfills [11]. However, these programs are successful only when there is cooperation between citizens and merchants, as well as adequate conditions for separating and recovering recyclable materials.

Grocery stores are small-scale commercial establishments that sell basic, everyday consumer goods. Due to their daily operations, they generate waste associated with product packaging and the community's immediate consumption. Because of their proximity to residents, they represent a strategic location for implementing initiatives related to waste separation, container return, and plastic reduction [12].

ANALYSIS AND DISCUSSION OF RESULTS

According to the research findings and as reported by Niño & Bolaños(2024) , by the year 2025, solid waste will increase to 2,200 million metric tons per year. These data highlight the urgency of developing strategies to manage solid waste. In developing nations, waste collection and disposal are pressing issues.

Every minute, 1,000,000 plastic bottles are purchased worldwide, and 5 trillion single-use plastic bags are used globally each year. Furthermore, of all the plastic ever produced, only 9% has been recycled, with approximately 12% incinerated. Consequently, the remaining 79% has been accumulating in landfills and dumps, causing environmental damage; therefore, swift action is necessary [18].

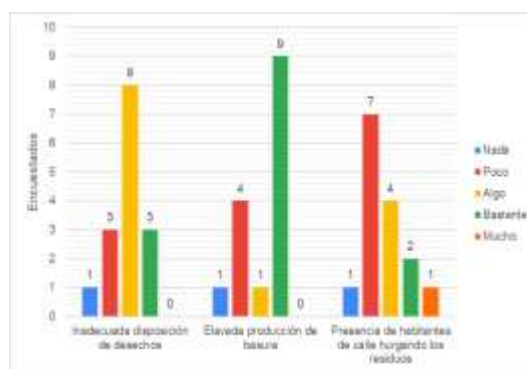


Figure 1. Level of impact due to various factors.

Source: Author's own analysis (2025).

According to the scenario presented regarding solid waste management, 9 out of 10 respondents stated that they were “quite” affected by the high volume of trash, 8 out of 10 respondents were “somewhat” affected by improper waste disposal, and 7 out of 10 respondents were “slightly” affected by the presence of homeless people rummaging through the trash.

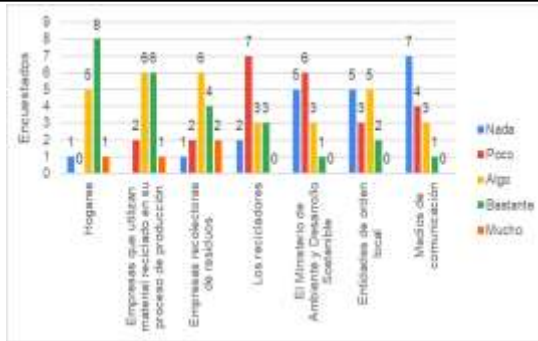


Figure 2. Level of contribution by stakeholders to proper waste management.

Source: Author's own work (2025).

Based on the questionnaire, respondents indicated that households make a “significant” contribution to waste management; 6 people responded that waste collection companies contribute “somewhat” and “significantly”; 7 respondents stated that waste pickers contribute “very little”; 6 respondents said the Ministry of Environment and Sustainable Development’s efforts are “minimal”; 5 respondents said the support provided by local authorities is “none”; and finally, 7 respondents said the support and contribution provided by the media is “none.”

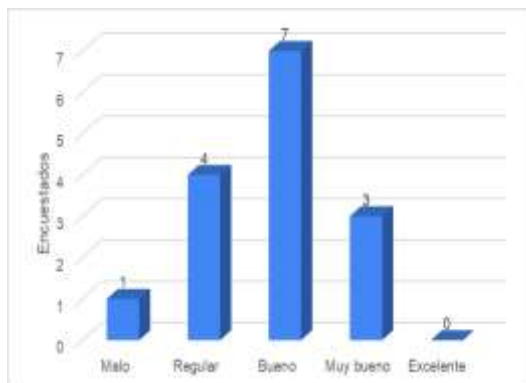


Figure 3. Waste collection service in the Colonia Caribe neighborhood.

Source: Author's own work (2025).

Based on the survey results, 7 out of 16 respondents rated the waste collection service in the Caribe neighborhood as “good”; 4 respondents rated it as “fair”; 3 respondents rated it as “very good”; and 1 respondent rated the waste collection service provided in the neighborhood as “poor.”

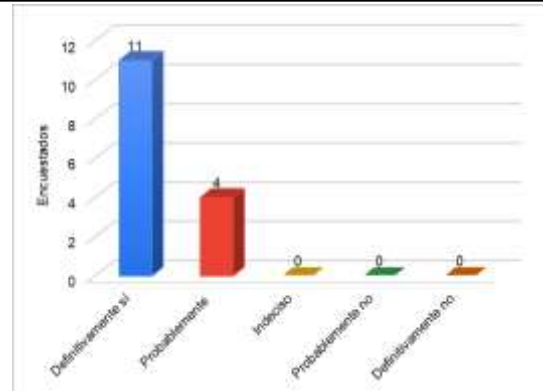


Figure 4. Acceptance of machines that pay for the deposit of recyclable materials.

Source: Author's own work (2025).

Respondents showed a high level of acceptance when asked if they would use a machine that pays them for the recyclable materials they deposit in it; 11 people said they would definitely participate, and 4 people said they would probably take their waste to these drop-off points.

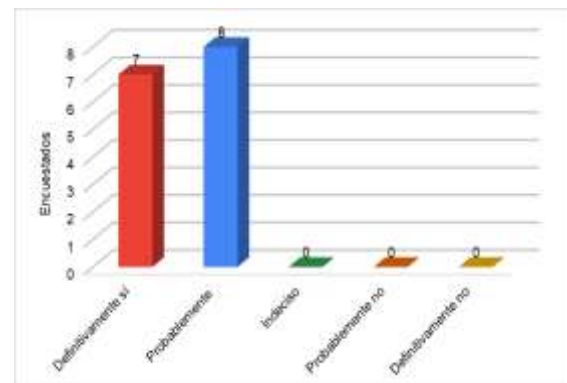


Figure 5. Acceptance of opening a collection center for reusable materials.

Source: Author's own work (2025).

According to the figure, 7 of the respondents who completed the survey stated that they would definitely welcome a recycling collection center near their homes, while 8 respondents indicated that they would probably welcome one.

The largest group showing interest in sustainability is the 20- to 45-year-old age group, as their survey responses were well-reasoned and demonstrated knowledge of the subject; furthermore, the majority of those who were available to take the survey were women[13].

Identifying this group of people interested in sustainability makes them a key target group for implementing strategies aligned with promoting the circular economy, sustainability, and environmental education.

Respondents agree and understand the importance of specialized treatment for solid waste to enhance the recycling and reuse of these materials; they also see opportunities for entrepreneurship, employment, and cost savings associated with recycled and innovative products, even those unrelated to the circular economy.

In general terms [17], inadequate solid waste management is one of the major environmental challenges of our time, with significant repercussions for both human health and the balance of ecosystems. Therefore, managing solid waste—especially through recycling—is seen as an alternative with the potential to generate income for society and reduce environmental pollution. This benefit can extend to grocery store owners, as it provides a mechanism through which waste is returned to the point of purchase and forwarded to companies to begin the process of reusing this waste, while also providing more information to interested individuals.

Implementing circular economy strategies for solid waste management has proven to be a promising approach to mitigating environmental impact and, in doing so, optimizing the use of resources [19].

Given people's high willingness to participate in the adoption of recycled products and solid waste management, this situation should be viewed as an opportunity to capitalize on the waste market.

CONCLUSIONS

In the Caribe neighborhood of Chetumal, Quintana Roo, there are 16 registered establishments, such as grocery stores, according to information from the DENU website [14], which is linked to INEGI. During the survey, five additional establishments were identified that are not registered.

The results show that, although residents are willing to improve their waste separation, recycling, and reduction practices, limitations persist due to a lack of information, adequate infrastructure, and community support strategies [15]. Likewise, research has concluded that waste recovery represents a step toward sustainability through the application of circular economy principles, reducing environmental impact and generating economic and social benefits [16].

It was found that grocery stores in the Caribe neighborhood represent a strategic location for promoting actions aligned with the circular economy, as their daily operations generate constant streams of containers, packaging, and materials that can be integrated into reuse or recycling systems. However, most of these establishments have not yet implemented formal responsible management practices, which highlights the

need to promote training initiatives, incentives, and guidelines that encourage the adoption of more sustainable practices. Overall, the findings indicate that residents recognize the importance of shifting toward more responsible consumption and waste management, but this process requires coordinated commitment among merchants, authorities, and the community. Strengthening environmental awareness, promoting the circular economy, and improving local infrastructure will enable progress toward a cleaner, more efficient, and more sustainable environment for the Caribe neighborhood and its residents. Future lines of research include socio-environmental culture and the circular economy.

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