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Improving Urban Resilience through Formal Integration of Waste Pickers in Jordan's Solid Waste Management

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Abstract

The main aim of this project is to study the situation of waste pickers around the world and to analyze the situation of the informal sector of solid waste management in Jordan specifically. Different methods like surveys and desk reviews did the study. It included studying their behavior, the places they work, the types of materials they collect, the method of collection, and much more. After this analysis, the focus was to find the most suitable method to formally integrate this sector with the government to benefit the waste pickers, the government, and the whole solid waste situation in the country. Based on the results of our study, recommendations for the waste pickers' situation in Jordan were given.

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Keywords

Solid Waste Management; Waste pickers; Jordan; Survey.

1. Introduction

1.1. Municipal Solid Waste in Jordan:

Throughout the past years, Jordan's population has rapidly increased for many reasons, such as the refugee crisis, the improvement of medical care, and political stability. Whenever there is an increase in the population number, there is an increase in the generation of SW, and based on the GIZ (2014) report, Jordan produces 2,077,215 tons of MSW per year, as shown in **Figure 1**, with an annual growth rate of 3%.

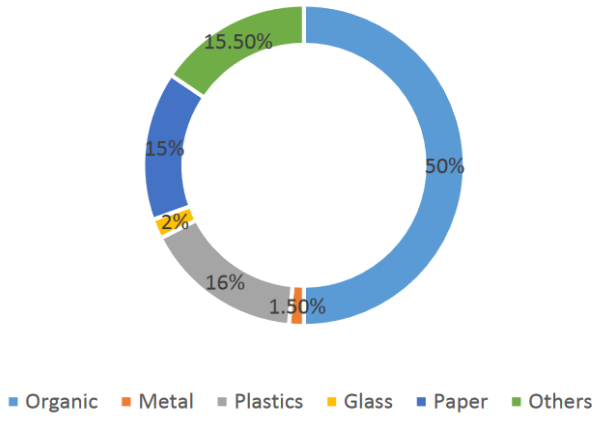

Figure 1. Composition of different types of MSW in Jordan from GIZ (2014) report.

Studies have shown that SW differs in type and from one area to another depending on the income rate, urbanization, and general lifestyle. The GWMO (2015) report showed that 34% of the MSW generated in high-income countries is organic waste, while 53% of the MSW is organic waste in low-income countries. Since Jordan is considered a low-income country, 50% of its MSW is organic, the highest among all types of MSW present.

Although 90% of the waste in the rural areas and 70% of the waste in urban areas is being collected, no waste is being composted in Jordan, 7% of it is being recycled, 48% is sanitarily landfilled, and 45% is illegally thrown in dumpsites as shown in **Figure 2**.

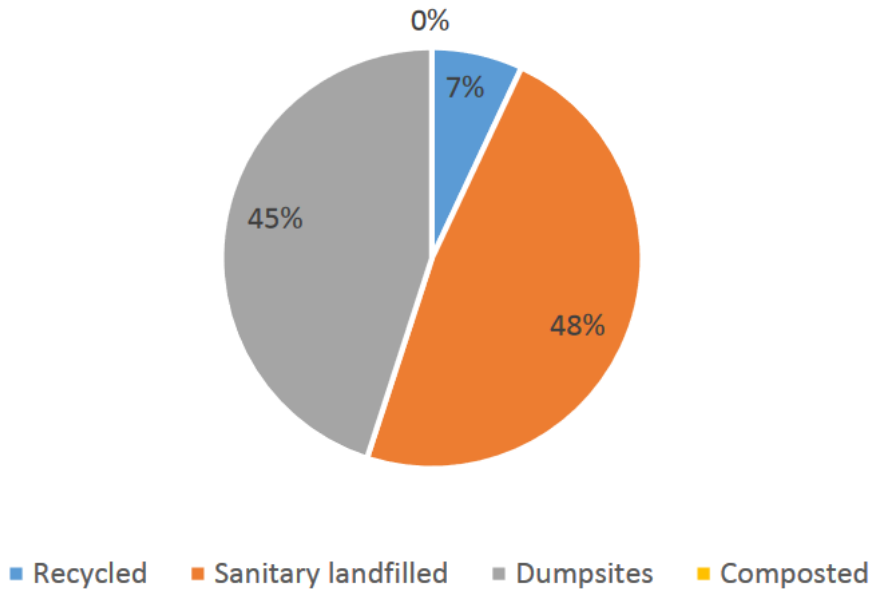

Figure 2: Percentages of waste disposal methods by GIZ (2014) report [1].

1.2 Landfills in Jordan:

All the waste generated throughout the years resulted in 21 domestic landfills in Jordan, with the Al Ghabawi landfill being the only engineered one [2]. The landfills are operated by 100 municipalities and 21 Jordan Securities Commissions.

Moreover, two public authorities are directly responsible for SWM in Jordan; GAM is mainly responsible for the Greater Amman Area (the Capital of Jordan), and ASEZA is responsible for the Special Economic Zone of Aqaba. The GAM is responsible for collecting, transporting, and disposing of the waste to the Al Ghabawi landfill site, considered the largest landfill in Jordan, serving ten other major cities besides the capital. As for ASEZA, the mission of collecting and transporting the waste is managed by a private company that disposes of the collected waste in a landfill operated by the common services council [3].

1.3 Informal Sector of Solid Waste Management

One of the main problems in the SWM sector is the informal sector, known as waste pickers, who are, based on the definition of ILO, individuals or small and micro-enterprises that intervene in waste management without being registered without being formally charged with providing waste management services. Usually, they are engaged in collecting and recovering reusable and recyclable solid waste from the source of waste generation to sell them to the recyclers directly or through intermediaries to earn their livelihood. Although this sector is not recognized or controlled by any official authority, it highly contributes to managing the city's MSW, as they collect, sort, reuse and sell it, retrieving its value in the recycling chain. **Figure 3** illustrates the basic root of MSWM in Jordan [4].

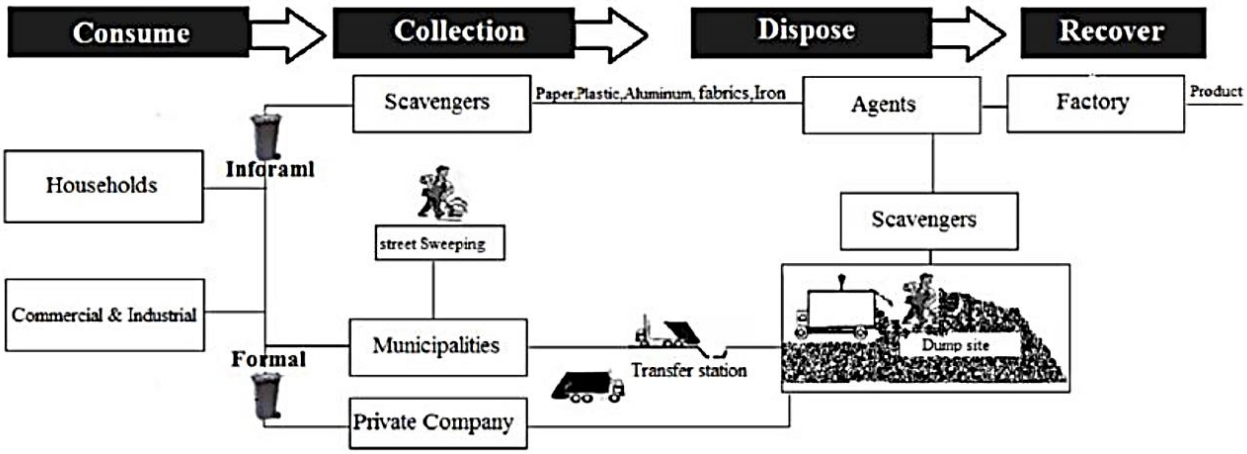

Figure 3: Flow chart for MSW streams and waste pickers' role in Jordan from Tafila Case Study [4].

In most developing countries, the structure of this sector is pyramidic, as in **Figure 4**, where at the top of the pyramid are the industrial shop owners or the scrap buyers who buy small quantities of waste (plastic, paper, glass, metals, etc.) from households. Below them come, numerous traders, including retailers and wholesalers, several of whom are not registered as businesses. At last, comes the waste pickers who freely collect waste from dumpsites, uncontrolled landfills, and municipal garbage bins. As we move up the pyramid, trade value increases [5].

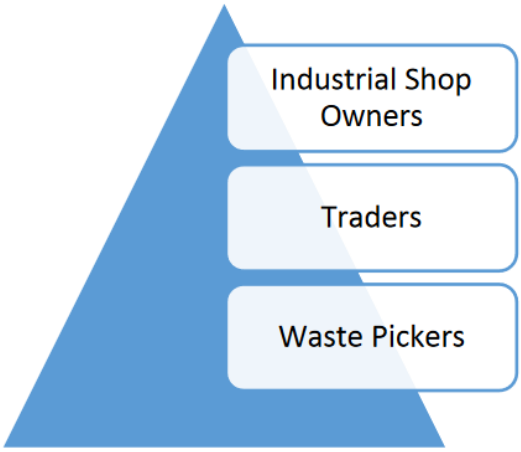

Figure 4: The structure of the informal sector in developing countries by CWG-GIZ [5]

In this paper, the waste pickers' situation in Jordan will be discussed further in detail, parallel to case studies from different countries worldwide. The first stage was to analyze and understand the full meaning of waste picking to identify the category of the society we are dealing with. The next step was collecting all the necessary laws, regulations, and instructions that concern or affect waste pickers in any way from the Ministry of Environment and the Ministry of Municipal Affairs. In addition, it is important to see what other companies have done on this topic, so a couple of reports were collected discussing waste pickers in Jordan. After that, the social aspects had to be considered from both the waste picker's point of view and the people of the society themselves. Therefore, a survey was done and filled out by the society, and a questionnaire was set and asked to the waste pickers themselves.

2. Methodology

This study was performed using the following methods:

- Desk reviews: Scientific and academic references related to the informal workers of the waste management sector as well as best practices followed in the world from middle to low-income areas, have been used.
- Surveys: An online survey was filled out by 160 people to identify the society's thoughts regarding the social condition of waste pickers in Jordan and to see how much people are willing to collaborate with the sector.

- Questionnaires: A set of questions was prepared and answered by waste pickers in order to have a clear view of their lifestyle and their challenges.

Discussion Sessions: Several discussion sessions took place with experts regularly to discuss each result and find the most suitable recommendations.

3. Results and Discussion

3.1 Waste pickers and landfills in Jordan

Waste pickers can collect waste from many different places. They can collect waste from houses, streets, sanitary landfills, and dumpsites. Unfortunately, there is not enough data or statistics in Jordan to summarize the exact amount of waste in each collection area [6]. However, different studies in different governorates in the SWM sector involved studying waste pickers. The focus is on Jordan's three landfills: Al-Akider, Al-Husyniat, and Madaba. **Tables 1 to 4** illustrate the number, age, gender, and education level of waste pickers in each of these three landfills:

Table 1. The number of Jordanian and Syrian waste pickers.

Landfill	Number of waste pickers	Number of Syrian waste pickers	Total number
Al Akaider	22-32	13-18	35-50
Hussenyat	10-11	20-24	30-35
Madaba	6-7	14-21	20-30
Total	38-50	47-63	85-115

Table 2. Ages of waste pickers

Landfill	Under 16 years	16-20 years	36-50 years	Over 50
Al Akaider	0	0	1	0
Hussenyat	0	0	2	0
Madaba	0	4	0	0
Total	0	4	3	0
Percentage	0%	21%	16%	0%

Table 3. Genders of waste pickers.

Landfill	Male	Female
Al Akaider	1	0
Hussenyat	8	2
Madaba	8	0
Total	17	2
Percentage	89%	11%

Table 4: Education level of waste pickers

Landfill	Primary school	Middle school	Secondary school
Al Akaider	1	0	0
Hussenyat	6	2	0
Madaba	6	2	0
Total	13	4	0
Percentage	68%	22%	10% did not attend schools

These three landfills are examples of ones that support the informal sector by allowing them to collect waste through contractors that handle all their issues. Other landfills do not allow waste pickers to enter the landfill, with Al-Ghabawi being one of them.

3.2 Laws and Regulations

Until 1980, the environment was not a known word in Jordanian laws and regulations when the Ministry of Municipal Affairs added the environment to its name, becoming the Ministry of Municipal and Environmental Affairs. This lasted for only 23 years; in 2003, a Ministry specializing in environmental affairs was created called the Ministry of Environment. Several legislations related to the environment have been enacted since the Ministry's inception until now [2]. The first environmental law in Jordan was published in 2003, along with the establishment of the Ministry, and then in 2006, a new version of the law was published, canceling the law of the year 2003. As for now, the current active environmental law is Environmental Protection Law No.6 of the year 2017, containing 31 articles [7]. In February 2005, Regulation No.27 for Solid Waste Management, based on article No.8 of the Environmental Protection Law No.1 of 2003, was published, holding only seven articles. These articles involved the basic measures of handling solid waste. Unfortunately, the phrase "waste picker" was not mentioned in the law or the regulation.

Based on these articles, we can deduce that although the Environmental Protection Law did not mention any specific articles related to waste pickers, these two articles affect them based on their daily activities of collecting wastes from public trash bins in an unsafe method, classifying them as illegal activities with legal consequences.

In 2019, Instructions for Solid Waste Management based on article No.7 of Regulation No.27 of 2005 for Solid Waste Management was published, having sixteen articles [8]. For the first time, "waste pickers" were mentioned in the definitions and the articles as follows:

"Waste Pickers: The people who pick up recyclable waste as waste management operations." Article 13 states that:

"General provisions for solid waste management facilities (landfills, sanitary landfills, and transformer stations):

The following shall be taken into consideration during the management of solid waste management facilities:

1. Not allowing informal waste pickers to collect waste under any circumstances in facilities dealing with solid waste.
2. Facilities officials assigned to dealing with solid waste must coordinate with the government to develop a simple infrastructure that allows waste sorting and helps waste pickers create micro-enterprises to sort waste formally.

Allow only authorized users to enter the site, exclude children and animals, and prepare a record for visitors to the site".

Although the waste pickers were noticed and identified in these instructions, they were not allowed to enter and collect waste from landfills and transport stations. This is due to health and administrative control, as most informal waste pickers do not follow the basic safety measures and bring children to work at the site.

On the other hand, the government obliged the facilities' officials to help the informal waste pickers by establishing small businesses integrated with the facilities' operation to formalize and legalize their work with the appropriate licenses and approvals.

In the year 2020, law No.16 for solid waste management was published called The Solid Waste Management Framework Law containing thirty-two articles and four appendices that explain the categories, properties, and disposal and returning methods of solid waste. The following articles had direct effects on waste pickers [9]. Article 27 prohibits informal waste pickers from collecting solids as they do not follow the appropriate procedure for each type or have no legal approval or license. Anybody who does not follow these law articles will face legal issues.

The main conclusion from all the laws, regulations, and instructions since the beginning is that each new one has more details and specifications in solid waste management and waste pickers topics than before. This indicates that although the changes are slow and not major, they still indicate that a developing country like Jordan is moving positively.

Building accurate simulation will significantly influence building predicted energy consumption [10]; many studies covering the building thermal performance in different climate zones to optimum building thermal performance [11-14], even the feasibility of using photovoltaics in terms of reducing the construction cost and saving energy [15].

The informal solid waste management sector has become a vital component of the system worldwide. Waste pickers play a significant role in the collection and recycling of waste, yet they face numerous challenges that hinder their integration into the formal sector. This literature review will explore the existing literature on waste pickers and their integration into the formal solid waste management system, specifically focusing on Jordan.

To earn their livelihood, waste pickers collect, sort, and recycle waste materials, mainly from the streets, dumps, and other public places. According to the World Bank, approximately 15 million people earn their livelihood through waste picking [16]. In developing countries, waste picking has become an essential livelihood for marginalized groups and contributes significantly to solid waste management. However, waste pickers face numerous challenges, such as low wages, lack of recognition, and unsafe working conditions [17]. Integrating waste pickers into the formal sector has been discussed for many years. Formal integration can give waste pickers better working conditions, higher wages, social security, and health benefits. Several countries, such as Brazil, India, and South Africa, have initiated programs to integrate waste pickers into the formal solid waste management system [18]. However, integrating waste pickers into the formal sector requires collaboration between the government, waste management companies, and waste pickers' organizations.

Waste pickers are crucial in the informal solid waste management system in Jordan. Waste picking has been a common livelihood in Jordan for many years, contributing significantly to the country's recycling efforts. However, waste pickers in Jordan face several challenges, including unsafe working conditions, lack of recognition, and low wages. Several studies have explored waste pickers' situation in Jordan and recommended solutions to integrate them into the formal solid waste management system. For example, a study conducted by Al-Sari et al. (2017) recommended establishing a waste picker association, providing them with training and education, and integrating them into the formal solid waste management system [18].

Waste pickers play a vital role in the solid waste management system worldwide. However, they face numerous challenges, such as unsafe working conditions, low wages, and lack of recognition. Integrating waste pickers into the formal solid waste management system can provide them better working conditions, higher wages, and social security. In Jordan, waste pickers contribute significantly to the country's recycling efforts but face several challenges. Several studies have recommended solutions to integrate waste pickers into Jordan's formal solid waste management system, such as establishing a waste picker association and providing them with training and education.

The study by Albatayneh et al. (2018) aimed to present an alternative approach to simulating wind effects on the thermal performance of buildings. In another study, Albatayneh et al. (2022) explored the potential of rooftop photovoltaic systems as a shading device for uninsulated buildings. Juaidi et al. (2022) experimentally validated the impact of dust on grid-connected photovoltaic system performance in Palestine, while Albatayneh et al. (2020) evaluated the effectiveness of infiltration against roof insulation aimed at low-income housing retrofits in Jordan [19-22].

Abdallah et al. (2022) investigated the effects of soiling and the frequency of optimal cleaning of PV panels in Palestine. Al-Omary et al. (2021) developed a hybrid moving average algorithm for predicting energy in solar-powered wireless sensor nodes. Muhaidat et al. (2021) emphasized the significance of occupants' interaction with their environment in reducing cooling loads and dermatological distress in East Mediterranean climates [23-25].

Albatayneh et al. (2020) highlighted the significance of sky temperature in assessing the thermal performance of buildings and compared temperature versus energy-based approaches in the thermal assessment of buildings (Albatayneh et al., 2017). Monna et al. (2021) simulated the potential energy use reduction in residential buildings in Palestine towards sustainable energy retrofitting. Finally, Albatayneh et al. (2018) adapted CFD modeling for building thermal simulation. These studies highlight the importance of sustainable and energy-efficient building design and management, focusing on contexts like Jordan and Palestine [26-30].

3.3. A survey that tackled society's view of waste pickers

An online survey was completed in Jordan to study where waste pickers stand in our society. One hundred sixty people filled out the survey; 105 (65.6%) were females, 133 (83.1%) lived in the capital Amman, and sixteen were educated university bachelor graduates. The next part of the survey was regarding waste pickers and their interactions with society in specific. The following questions were asked:

1. How often do you run into waste pickers?

As shown in **Figure 5**, 10 (11.3%) people barely see them each month, 37 (23.1%) see them weekly, 59 (36.9%) notice them daily, and 46 (28.7%) do not see them anywhere near them.

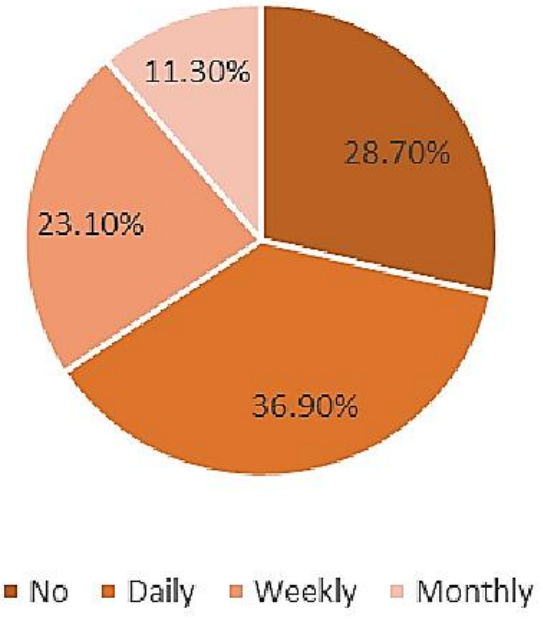

Figure 5. How often do people run into waste pickers?

2. Have you ever witnessed a waste picker involved in any illegal activity?

As part of the survey, it was important to see if anybody witnessed a waste picker involved in any illegal activity. In order to prove that most of them are decent people, and fortunately, people proved us right as 144 (90%) of them answered that they have never seen any waste picker involved in any illegal activity. The other 16 (10%) mentioned that they have seen them steal or destroy public properties.

3. Have you ever interacted with a waste picker?

Although most people who filled out this survey see waste pickers on a different time basis, 112 (70%) never interacted or even spoke with them. In comparison, 46 (28.7%) interacted with them and found it a comfortable experience; the rest 2 (1.2%) felt that their interaction was scary and uncomfortable.

4. Are you with legalizing their work by forming a waste pickers' syndicate?

129 (80.6%) of people were against forming it, and the rest were against it. This could be due to financial issues that could occur between the waste pickers themselves.

5. Would you mind having regular direct contact with waste pickers? For example, them coming to your home and collecting the waste?

Most people mentioned that they had never faced a problem or witnessed illegal activity regarding waste pickers. Moreover, they support formalizing and integrating them with the government. However, 86 (55.1%) of them were against increasing the interaction between them and the waste pickers by allowing the waste pickers to come and collect waste from households on a regular organized basis. This number is considered relatively good; maybe if more people filled out the form, more people would approve.

6. Are you providing health insurance and education rights for child waste pickers?

One important aspect of waste pickers is child waste pickers. These children do not have basic human rights like access to schools or even health insurance. Therefore, part of this survey was regarding these children, where 153 (95.6%) of them expressed that children should not be allowed to work like this but should have the basic opportunities like any other child.

3.4. Questionnaire for waste pickers themselves

The survey gave a clear image of how society looks at waste pickers, but another important part was to see the waste pickers' side, so we decided to interview them. The interview was held on November 21, 2019. The waste pickers interviewed lived on the land next to the industrial area in Al Bayader, Amman. **Figure 6** shows one of the waste pickers living places.

Figure 6. The picture was taken during the interview.

There were inconsistencies in the answers of those who were asked. Some said they are originally from Palestine to feel more socially accepted. However, they are actually from Turkmenistan, a sovereign country in Central Asia. They speak their Turkmen language, and they came to Jordan during the rule of the Ottoman Empire, and during the days of King Hussein, they were granted Jordanian passports. They also did not give us accurate numbers regarding the money they earn from selling the waste as it comes to money (USD14 to USD35). They feel threatened that people might think that they earn a lot from it or that they might even create businesses that might affect their work. What was also noticed from this interview is that they always feel threatened that they might be evacuated from the country, even though many of them have Jordanian passports. Also, waste pickers do not have a negative social effect on society as much as they have a positive one; they help society. In addition, the way that people look at them as normal people with tough jobs and living conditions shows cultural development.

4. Conclusions and Recommendations

Informal solid waste management via waste pickers was studied and analyzed in Jordan. The main conclusion from all the laws, regulations, and instructions since the beginning is that each new one has more details and specifications in solid waste management and waste pickers topics than before. This indicates that although the changes are slow and not major, they still indicate that a developing country like Jordan is moving positively.

Many different solutions can be done regarding waste pickers; these solutions can be categorized into three main methods. The first method would be integrating them into the national solid waste management plan of the government; the second would be establishing small enterprises by the private sector, and the third would be Community Based Organizations. Moreover, before the government decides to integrate them into its plan, it should have full knowledge of the costs of managing solid waste and compare it to the costs that will be saved when the informal sector is integrated.

To begin with, dealing with waste pickers is not very easy, especially when it comes to the most important thing to them, which is waste, as it is their main source of income. Therefore, when working with them, we should ensure they still have access to waste and the right to own it, adding that the government will hold a share of the total income.

Therefore, the government can assign waste pickers many different jobs, such as:

1. Collecting waste from a household level regularly. (Raising awareness to people regarding the separation of different types of wastes before this would result in benefit).
2. Collecting waste from landfills, sanitary landfills, and dumpsites.
3. Sorting the collected waste.
4. In some cases, reselling it to consumers.

These jobs also apply when it comes to small enterprises as well. They would hire waste pickers to collect waste according to the national solid waste management plan. The difference between small enterprises and the government is that the private sector runs small enterprises; therefore, the income would be shared with the waste pickers and the owners. These enterprises will reduce the governments' costs of managing solid waste.

The third solution would be Community Based Organization (CBO); in a community-based organization, people develop a suitable method to collect, sort, and sell its generated waste. The workers of the CBO are all from the same community, which provides more job opportunities. In addition, all the money earned after the expenses have been paid can be invested in improving the local community.

Studies from around the world have shown that these three methods were the most efficient ones when the following rules are followed:

1. Providing shelter for most of the homeless waste pickers.
2. Providing them with at least the basic health insurance of the company.

3. Providing with safety wear during working hours.
4. Providing them with the necessary facilities like bathrooms in their working areas.

Another important recommendation would be to sort out all the numbers of waste pickers organizations and join the Global Alliance of Waste Pickers or even create a national alliance of our own. When this sector is integrated, different parties benefit from it, some financially, others socially, and for most of them, better life quality is provided.

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