Waste Collectors and Their Role in the Recycling or Making a Living by means of garbage containers : A Proposal for System Development

[1]*Cemil Örgev, [2]Durmus Karayel, [2]S. Serdar Ozkan, [3]Ismail Gümüş and [3]Gökhan Atalı
[1]*Faculty of Business Administration, Health Management, Sakarya University, Turkey
[2]Technology Faculty, Department of Mechatronics Engineering Sakarya University, Turkey
[3]Vocational School of Sakarya, Sakarya University, Turkey

Abstract

This study is the general framework of a comprehensive project on waste collectors and recycling. The study deals with waste collectors and their role in the recycling of waste. At first, current situation about subject has been analyzed in detail. Then, problematic areas which need to be improved have been determined and possible solutions have been investigated. Finally, a systematic model to create the infrastructure of the project have been presented using the obtained findings. It is hoped that this study will be the first step for this beneficial initiative.

Key words: Waste policy, Waste collectors, Public-private partners

1. Introduction

The current consumption-driven lifestyle in the high consuming world is environmentally damaging and increasing inequity in society due to the disproportionate utilization of ecological systems[1]. Therefore, the management of solid waste has become a significant research problem that combines technical, economical, environmental and social issues. Environmental and social issues emerge as people become increasingly concerned about the risks associated with living close to solid waste facilities[2]. One result of a rapid urbanisation, a slowly reducing gap between urban and rural, changing consumption patterns, and a growing population is the problem of waste. For the reasons mentioned above, the waste management has become an essential duty of municipalities in the world. However, unfortunately, municipalities collect wastes and transport to storage rather than applying the proper waste management in many cities. The prevention of the negative impacts of wastes to environment is very important. However, its economic value should also not be ignored. Nowadays, garbage collection has become a source of livelihood for people who are in the fight for survival due to economic value of wastes. This case has revealed a new sector (recycling). Recycling means to put used objects or materials through a special process so that can be used again. Recycling starts with people separating recyclable materials from other trash next separate recyclable materials are collected by recycling programs and processed at recycling plants. These processed recyclable materials are then sold to manufactures for use in new products. Making new things from recycle ones takes less money, less energy and less of the earth's resources. Because, less energy is used, factories do not release as much pollution either in addition recycling conserves energy and raw

*Corresponding author: Address: Faculty of Business Administration, Department of Health Management, Sakarya University, 54187, Sakarya TURKEY. E-mail address: corgev@sakarya.edu.tr, Phone: +905323682957

materials needed to make new products. By recycling or reusing plastic metal and glass items, you can reduce the need to mine, transport and manufacture natural resources to make new products. The recyclable materials are aluminium and steel cans, cardboard, glass, newspapers and plastic bottles. These items can be made into new products, including cans, the steel used to build skyscrapers and buses, cardboard boxes, glasses, jars and bottles, newspaper and office paper, plastic detergent bottles and even day ground equipment. As more and more people buy products that are reusable, refillable or concentrated, manufactures will take notice and produce more of these environmentally friendly products. Other ways reducing trash are avoiding products with excessive packaging, repairing, rather than replacing, broken items, donating unwanted materials to charity and using re-usable bags. As understood, waste collectors have achieved a very important activity in terms of both contribution to employment and the national economy. On the other hand, this sector is growing in an uncontrolled way increasingly and so, it also reveals many social and managerial problems. It will reveal bad results when this potential isn't effectively managed. The management of solid waste has become a significant research problem that combines technical, economic, environmental and social issues. Therefore, researchers in this field have focused on the management of solid waste.

The Hand in Hand project team has aimed a decentralised solid waste management (SWM) scheme in one panchayat in Kancheepuram District, Tamil Nadu, India, thereby improving the local environment and offering continuous employment to individuals from socially and economically disadvantaged groups[3]. Asi Eugene Ndum has prepared a thesis on Bottom-Up Approach to Sustainable Solid Waste Management in African Countries[4]. Peter J.M. Nas and Rivke Jaffe have discussed the poorly assessed topic of informal waste management systems, in which there appears to be a high level of heterogeneity throughout the world[5]. Sudhir V. et al have integrated Solid Waste Management in urban India and proposed a Critical Operational Research (COR) framework to facilitate consensus/conflict resolution among actors, and also aid in learning[6]. Martin Streicher-Porte et al. have studied about Key drivers of the e-waste recycling system. They have assessed the management and recycling of waste electrical and electronic equipment (WEEE)[7]. Emenda Sembiring, Vilas Nitivattananon have explaned the role of informal recycling in SWM in Bandung, Indonesia, by using the material flow method[10] This problem can be only solved with a comprehensive project on waste collectors and recycling. This study occupies the general framework of such a project. At first, current situation about subject has been analyzed in detail. Then, problematic areas which need to be improved have been determined and possible solutions have been investigated. Finally, a systematic model to create the infrastructure of the project have been presented using the obtained findings.

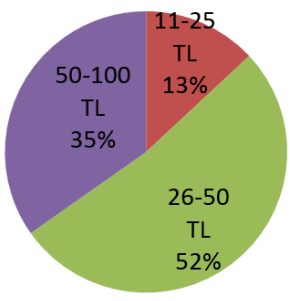
2. Current Situation and Problem Analysis

Waste is collected by two different groups including municipality and individual initiatives in the selected pilot region called Erenler Municipality. Municipality collects wastes as mixed without any separation process and transports to landfills. The workspace of other groups (individual collectors) is garbage containers. They collect wastes separating according to their economic values. In other words, street collectors take paper, glass and metal wastes by mixing container. Their working conditions are very bad. They carry out work with their physical power without

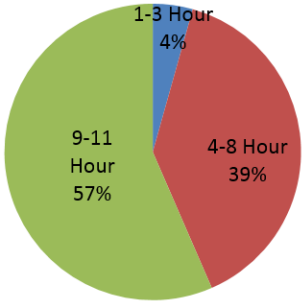
any equipment for collecting, sorting and transporting. Also, they cannot care physical hygiene. The following figure 1 shows this situation clearly.

Figure 1. Waste pickers in Erenler District

This study not only is based on observational data but also it is based on inquiry that has been realized by face to face meetings with waste collectors.



How much do you earn per day?



How many hours do you work in a day?

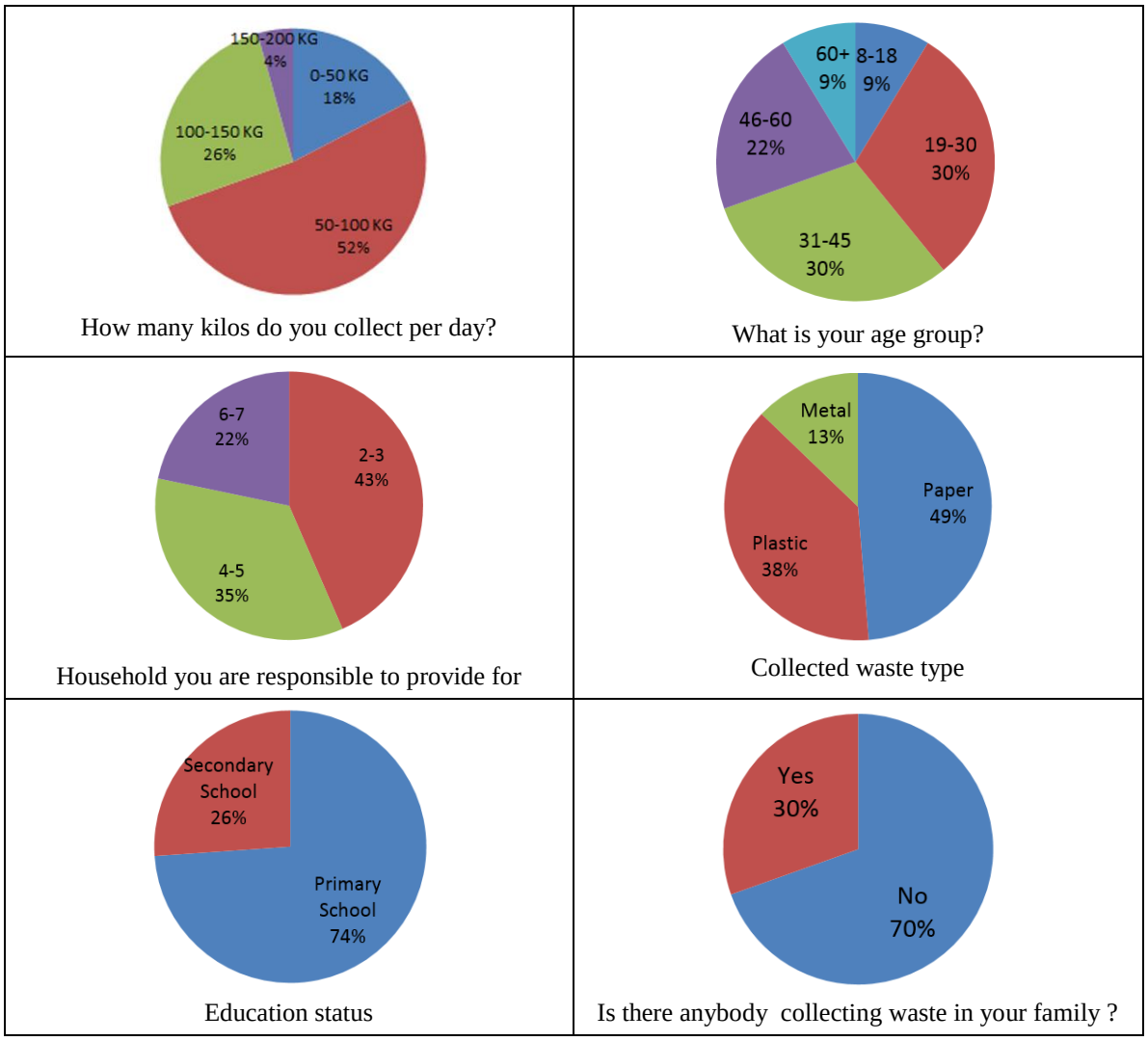


Figure 2. Survey results realized with waste collectors

The questionnaires show that 70% of waste collectors wants to work be subject to legal minimum wage rate and the Social Security. Also, 96% of waste collectors are not trained in waste collection. Their income is collecting waste only. 13% of them have serious health problems due to collecting waste. 91% of them is Turkish and 9% of them is Syrian. 91% of them is man and 9% of them is woman. During the picking process, the vast majority of them want to use special equipment for work. But they cannot use because of economic deficiencies.

In this century, the images presented above cannot be explained any way in respect to the reached level of technology, urbanization, and human rights. This stray initiative should be organized by many organizations such as municipalities, non-governmental organizations, government officials, private sector and etc. These mentioned organizations have to take responsibility to solve this social problem. As it can be seen, this subject has a multi-dimensional

and complicated structure. This case requires an integrated waste management model. Therefore, at first, a waste management system model has been prepared. Later, this model has been applied step by step.

3. Waste Management System Model

Essentially, the proposed model is a part of comprehensive project. General model which consists of two main modules has been presented in figure 3. The scope of this study is related to the first module that consist of parts such as waste storage and handling, waste collection, waste transportation. The second module of model consists of material recovery facility, composting facility and energy recovery facility. This model hasn't been discussed here and will be the subject of further research. Revolution begins at home for each subject. Application of the model will be started at home. Garbage producer households and waste collectors will be trained about individual hygiene, collection-separation techniques and using modern equipments related to the new job.

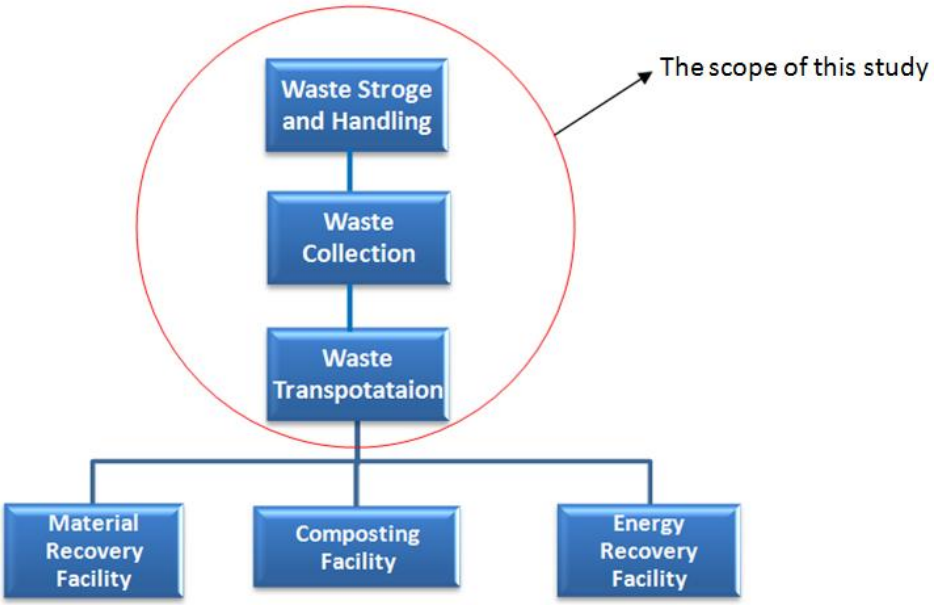


Figure 3. Framework for Waste Management Model

On the other hand, as shown in Figure 5, management hierarchy consists of five target options such as reduce, reuse, recycle, recovery and disposal. But, this study is concerned with only the recycling process. Because, in selected pilot regions, the street pickers only take into account to recyclable solid waste. But, this study is concerned with only the recycling process. Because, in selected pilot regions, the street pickers only take into account to recyclable solid waste. There are two different sectors called formal(public) and informal in the selected pilot region. The other important aim of this study is to integrate the informal structure with the formal structure.

The purpose of this integration is to improve the working conditions of informal collectors and ensure the sustainability of the recycling process. Many hundreds of people in the pilot district depend on recycling materials from waste for their livelihoods. Informal sector has both positive and negative aspects. It is hoped that informal pickers' livelihoods, working conditions will be improved and the efficiency of available recycling will be increased when the project is carried out. Despite the health and social problems associated with informal recycling, it provides significant economic benefits that need to be retained. Experience shows that it can be highly counterproductive to establish new formal waste recycling systems without taking into account informal systems that already exist. The preferred option is to integrate the informal sector into waste management planning, building on their practices and experience, while working to improve efficiency and the living and working conditions of those involved[8]. Waste is a subjective notion. Some see waste as a risk to public health and the environment, some see it as a mere aesthetic inconvenience, and others see it as a source of income. In the informal recycling sector, there is no question that waste is perceived as a resource[10]. Waste pickers are often faced with risk, unhygienic environments, criminal activities and even, some of them are homeless and vast majority of them are very poor, unemployed, and backward.

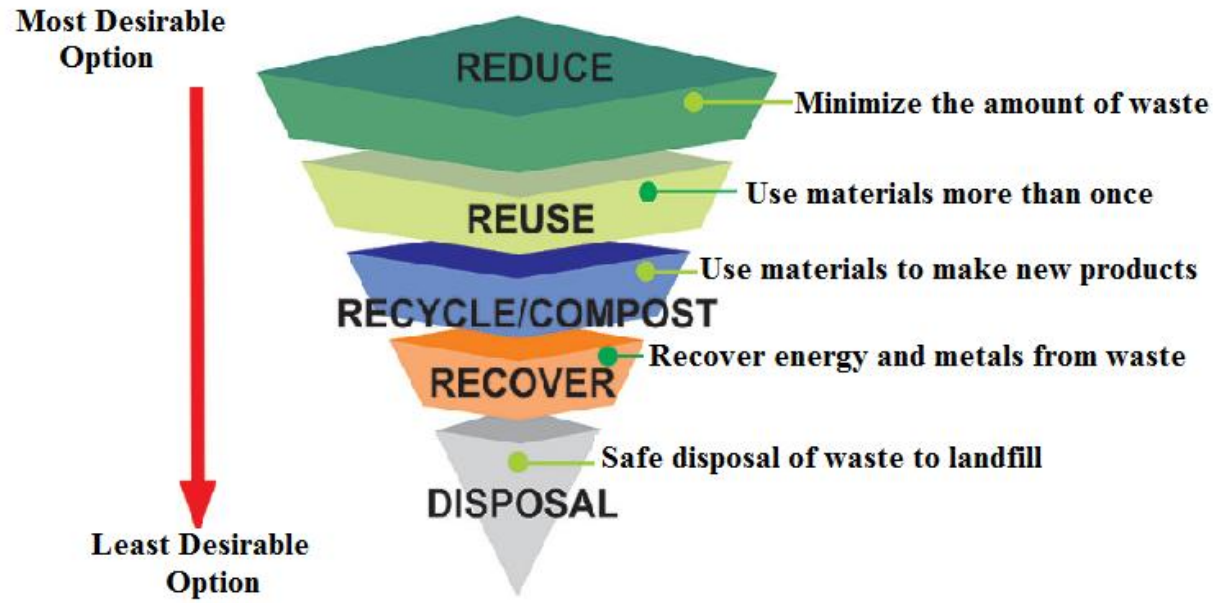


Figure 4. Waste Management Hierarchy Diagram(Adapted and redrawn[9])

3.1. Waste storage and handling

Waste storage and handling is related to household directly according to the proposed study. It is the first step of the recycling process. It is the first step of the recycling process. Therefore, families will be trained firstly and encouraging opportunities will be offered to them with regard to their adaptation to the system. In this context, disposable recycling bags and waste weighing platforms seen in figure 5. will be given to families. Also, once a year, food waste bins seen in figure 5. are given to families as a gift after reaching the specified amount of solid waste. More importantly, the payment card for collected waste will be given to families and so, they can get their payment according to the amount of waste.

Figure 5. a) Disposable recycling bags for plastic, glass, paper and metal waste,
b) Waste weighing platform with separate indicator

Figure 6. Twin Compartment Stainless Steel Recycling Kitchen Pedal Food Waste Bin

3.2. Waste collection

A personnel for each of 10 families will be appointed to remove solid wastes from families. Project stakeholders are Turkish Labor Agency, Social Security Institution, Erenler Municipality, The Licensed firms and Sakarya University in Turkey. Waste Picking will be recognized as a profession with a special state in Erenler pilot region. A fixed fee determined by project stakeholders and a price corresponding to the collected waste will be paid for waste pickers gained formal status. They will have the social security rights. Also, required personal hygiene materials, uniforms designed for job and a specially designed car operated with electricity will be supplied.

3.3. Waste transportation

Waste transportation contains the most important part of the process. At the present time, wheelbarrows used by informal waste collectors are very primitive. This situation causes decreasing in the work efficiency, to the various occupational diseases, visual pollution and also unwanted crimes. Special vehicles containing advanced technology equipment associated with job will be designed and manufactured for the transportation of wastes as seen in the figure 7.

Figure 7. Special prototype vehicles containing advanced technology equipment

GPS-based hardware supplied by tracking and remote control will be integrated into the special waste transportation vehicle. This vehicle will be defined for owners by RF-Id identities card that prepared by new technologies. It is planned to be more efficient garbage transportation thanks to the performance analysis, the timelines, the work location and the time reports taken by our system. The transport vehicle is equipped with a reliable weight measurement system. The instant location information of the vehicle and the waste reports can be obtained by waste management center. In addition, this innovative approach waste transportation vehicles' disinfecting procedures will be carried out as periodically.

4. Conclusions

Recently, livelihood of many people depends on recycling materials from wastes. The aim of this study is to improve their livelihoods, working conditions and efficiency in recycling. For this purpose, the present informal recycling system has been transformed into a formal recycling process, because to establish a new formal recovery systems is very expensive. In this way, both the efficiency of the process and the living and working conditions of the waste pickers have been improved. In summary, the obtained benefits based on results of the study are preserving natural resources, decreasing energy consumption, reducing need for landfills, decreasing garbage, raising consciousness.

This study will form the basis for the considered project in the future. It is hoped that its economic, social and environmental positive effects will be seen in case of realization of the project.

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