

A MEASURE AGAINST POLLUTION WASTE SORTING IN NORTH CYPRUS: OPINIONS OF MUNICIPAL AUTHORITIES ON THIS ISSUE

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Abstract

North Cyprus is a territory on the third largest ranking mediterranean island, it occupies about 3,241 square kilometers with a total population of about 326,000 people. This study investigates the attitudes and behaviors of municipal waste workers in regards to waste separation and sorting practices in North Cyprus. The study carried out a survey among the municipal SWM workers to evaluate their knowledge in waste separation, their perceptions of the municipality's processes of SWM, their perceptions on the importance of waste separation in North Cyprus, as well as get their feedback on ways and methods to improve waste separation practices in North Cyprus. Findings on the survey study have indicated poor and inadequate practices of waste separation in North Cyprus that need development and restructuring. The study also found out that the SWM practices on North Cyprus are inadequate as perceived by the municipal workers, and have suggested improvement of the facilities and amenities of SWM in the municipalities. Opinions of respondents also suggest more needs to be done in raising awareness in both SWM municipality workers, and the general public to ensure waste separation practices are adopted in efforts of SWM which they all agreed is important for the country.

Keywords: Municipal waste management; waste sorting; waste management; North Cyprus.

1 Introduction

Cyprus is an island with an area of 9,251 sq.km Cyprus ranks as the third largest Mediterranean island after Sicily (25,710 sq.km) and Sardinia (24,090 sq.km). The Turkish Republic of Nord Cyprus including the small Coastal enclave of Erenköy, accounts for 3,241 sq.km. From its small eas- ternmost point. Zafer Burnu [Cape Victory). To Paphos harbour in the west is a distance of 226 km while Cape Kormakiti in the north is 96 km from Cape Gata in the outh (Ilseven, 2022). Cyprus can be seen as the meeting point of Europe, Asia and Africa. The closest country to it is Turkey, a mere 70 km to the north from Kormakiti to Anamur, while Syria's Cape lbn Han lies 96 km east of Zafer Burnu. The distance to the mouth of the Nile in Egypt is 400 km. The strategic and political importance of the island in relation to its East Mediterranean neighbors is thus obvious. With its position at the intersection of eastern and western cultures and its proximity to the sensitive oil-rich countries of the Near East, its military and political significance grows day by day (Ilseven, 2022). The land formation of North Cyprus is characterized by the epeirogenic movements which can be defined by the five main headings of the island: Troodos mountains, Kyrenia mountains, Mesarya plains, Coastal plains and the Karpaz mountains. The climate of North Cyprus is

situated where the four seasons are encountered distinctly (Ilseven & Bastas, 2020). North Cyprus is a country faced with many socio economic challenges and does not have the technical, economic, and social standards of the European Union (EU) despite its sister island (Republic of Cyprus) being a part of the EU. According to studies, North Cyprus also has a significantly low level of environmental awareness and has unaddressed environmental protection and adequate SWM challenges. SWM has only become a concerning matter to the government of North Cyprus in recent times, and yet the process of SWM in North Cyprus is still challenged by inadequacy despite having a relatively small landmass and relatively small population (Azarmi et al. 2018)

North Cyprus has around 164 cities and villages combined that operate under 28 municipalities. The municipalities in North Cyprus are the authorities tasked by law and policy of the country to carry out SWM, the municipalities operate a total of 23 open dumps. Waste in North Cyprus has an inadequate collection and are often dumped by some people at convenience. Open dumps in the country have been associated with some environmental challenges and problems, some of the environmental challenges associated with poor and inadequate SWM in North Cyprus include groundwater and surface water pollution, air pollution and public odor problems (Ruben & Paralik, 2006). A report released by the North Cyprus department of environmental protection, in 2016 the country produced a total of 242,664 tons of solid waste (KKTC Department of Environment, 2019).

2 Solid Waste Management

Solid waste is defined as discarded, abandoned and unwanted materials that are generated from human activities such as domestic activities, industrial activities, agricultural activities, biomedical fields. Solid waste, unlike the primary word in the term, may be waste that is liquid, semi solid or even gaseous in nature (Sewak and others, 2021). The rise of population and human activities across the globe has been reported to have also resulted in significant levels of solid waste across the globe. Solid waste has been associated with critical environmental concerns of great magnitude which can only be mitigated through adequate management of solid waste using a process termed as Solid Waste Management (SWM) (Abdallah et al, 2020).

Solid waste management is a process which entails several dimensions to it, SWM is a process which tries to mitigate the negative impacts of solid waste generation at all levels of livelihood (Bautista, 2019). SWM has been defined as a process that deals in the collection of generated waste, treatment of collected waste, and disposal of solid waste because it is no longer useful. Inadequate SWM process can lead to severe environmental challenges such as pollution and unsanitary environments that can endanger both the environment and public health. Inadequate solid waste management creates a ring of problems which include social problems, health problems, economic problems and administrative problems. An adequate SWM is a process which is described as most efficient when precautionary measures or techniques are used in a society, and a precautionary measure in SWM ensures the generation of solid waste is kept as a minimum which also helps in the SWM process. The European union described the waste process in a hierarchy as illustrated in figure. This process promotes waste recovery and waste reduction and is greatly influenced by the process of waste separation (Rousta et al. 2017).

Waste separation or waste sorting is a process of waste separation into different elements which make up the waste, waste sorting is a process that can be carried out manually or automatically either at the point of generation or at a waste recovery facility. Waste separation and sorting is a technique of adequate SWM which is praised as an efficient way of environmental protection and sustainable SWM to mitigate the

deterioration of the environment through waste generation (Yu & Li, 2020). Waste separation is considered as a critical aspect of sustainable SWM techniques before disposal of waste, this process enables the recovery of valuable waste components and elements in order to recycle or reuse valuable aspects of generated and collected waste. Waste separation is a process that has been associated with improvement of resource utilization and environmental protection/sustenance (Zhou et al. 2018).

2.2 Solid Waste Management in North Cyprus

SWM in North Cyprus is a process carried out as a responsibility of the Department of Environment under the ministry of Agriculture, Rural Development and Environment. The guiding principles in North Cyprus SWM policies is the use of the hierarchy of mixed methods of SWM methods (KKTC Department of Environment, 2019). This waste management strategy has been taken as a preventive and precautionary method of environmental sustainability, this encourages the reduction of waste and recovery of solid waste especially municipal waste. North Cyprus has two main legislations for SWM which are the solid waste control regulation of 1997 and the waste disposal of municipalities law of 1995; environmental protection law (21/92) and municipalities law (51/95). The 1995 legislation emphasizes the law of the North Cyprus municipalities as the sole responsible establishments in the country for SWM in the country. The laws and policies of SWM in North Cyprus are designed for elimination and reduction of the impacts of waste in the country, the laws are also designed to promote reuse and recycling of waste during the SWM processes (Ertac & Cankan, 2021).

3 Aims and Objective of Study

This study will focus on Lefkosa municipality of North Cyprus as a study area for the evaluation of the waste sorting practices and opinions of the municipal authorities on such waste sorting practices in the municipality. The study is aimed at reaching an empirical finding on how to find adequate solutions to complement the current waste sorting practices and waste management practices in North Cyprus.

4 Methodology

Considering the literature review and overview/background of the case study, a structured closed ended questionnaire was designed to investigate the waste separation and sorting perception of the municipal waste sorting department of North Cyprus. The designed questionnaire is designed with 5 sections which are characterized as follows: section 1 is the demographic survey section, section 2 is the waste separation awareness question section, section 3 is the municipal waste separation facilities assessment section, section 4 is the perception of waste separation in North Cyprus, and finally section 5 is the section of questions regarding how to make the waste separation in North Cyprus better from the perspective of the waste separation department workers. The questionnaire items are illustrated in Table 1 with all its sections.

Table 1: Questionnaire sections and items descriptions

Section	Items in Section	References
Demography	Gender Age Years of experience Level of education	Debrah et al. (2021)

Waste separation awareness	Do you have knowledge of waste separation? Do you think waste separation is important? Have you been separating your waste?	Debrah et al. (2021)
Municipal Waste Separation Facilities	Does the municipality give adequate training on waste management and separation? Does the municipality have adequate waste separation facilities and amenities? Are the municipality waste management facilities adequate? Are the waste sorting facilities adequate? The waste sorting facilities consider waste separation?	Razali & Wai (2019)
Perception of waste separation	Do you think North Cyprus will benefit from waste separation and make the environment better? Do you think North Cyprus needs more waste separation efforts to be implemented? Do you think municipal workers know enough about waste separation?	Chen & Lee (2020)
How to make waste separation better	Should the municipality consider focusing on waste separation? Should the municipality carry out public education programs on waste separation? Should waste separation begin with household owners? Should waste separation be the responsibility of the municipality only?	Razali et al. (2020)

5 Results and Discussion

The collected survey data was collected in a spreadsheet for further analysis using statistical methods of frequency analysis. The results and discussion of the survey data are presented in the following section.

The demographic frequency analysis of our collected survey data indicated all 100% of the survey respondents were male. 33% of the respondents have more than 10 years' experience in the waste management department in North Cyprus while 66.7% of the respondents had between 6 to 10 years of experience working in the waste management department in North Cyprus, Figure 1 illustrates the frequency of the respondent's years of experience in a pie chart.

Count of Years of Experience

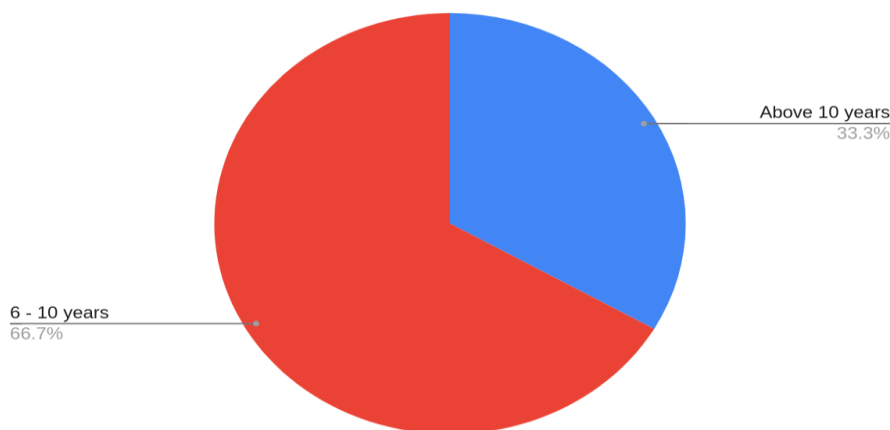


Figure 1: Chart of respondent years of experience

The educational background of the surveyed respondents also showed 33.3% of the survey respondents having a highest education level of secondary school certification and 66.7% of the respondents having a higher institution level education. Figure 2 illustrates the frequency of the respondent's highest level of education in a pie chart

Count of Highest Level of Education

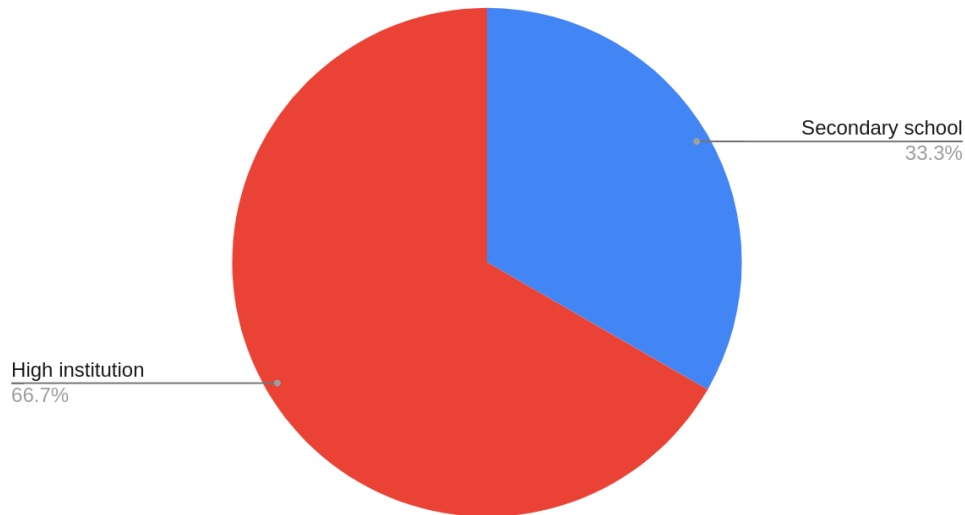


Figure 2: Chart of respondent highest level of education

5.1 Waste separation awareness

The items of the survey questionnaire in the section of waste separation awareness asked respondents about their awareness on waste separation to which 100% of the respondents answered they are aware of waste separation as a method of SWM. Also, 100% of the respondents answered yes to the importance of the waste separation technique of SWM. However, the difference in response was observed in the analysis of the question on whether the respondents practice waste separation personally, 50% of the respondents answered yes and 50% of the respondents answered no. Despite 100% of the respondents showing awareness about the subject of waste separation, only 50% of the respondents personally indulge in waste sorting.

5.2 North Cyprus Municipal Waste Separation Facilities

Three items were used in the section of the questionnaire investigating the waste separation facility of North Cyprus. The first question regarding training on waste separation by the waste management departments received a 66.7% response rate of no adequate training given to the workers in the department. 83% of the respondents also responded there are no adequate facilities and amenities for waste separation in the departments of waste management in North Cyprus, also with regards to the efficiency of the waste management facilities in general not considering the waste separation services, the respondents had the same response rate of the facilities of SWM not being adequate; 83.3%. Figure 3 illustrates the frequency of response to adequacy of waste separation facilities in North Cyprus.

Count of does the municipality have adequate waste separation facilities and amenities?

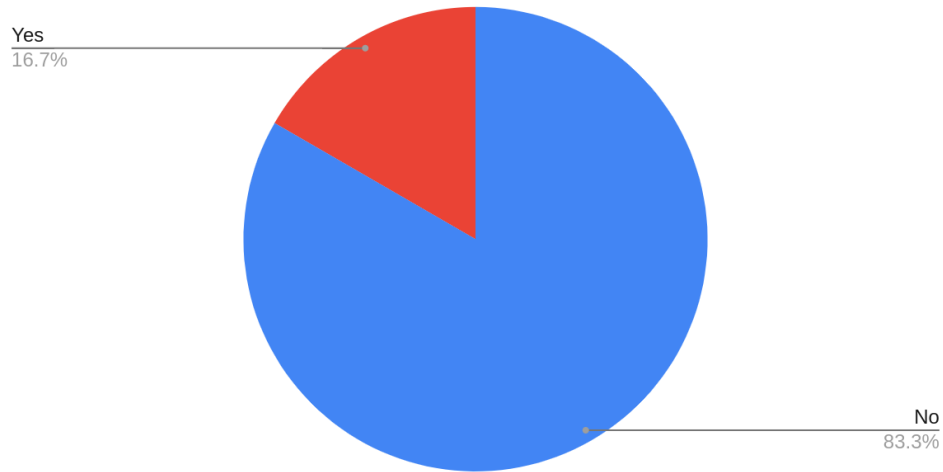


Figure 3: Chart of respondent answer to waste separation facility adequacy in North Cyprus

The analysis of waste separation facilities and amenities based on the response of the SWM department in North Cyprus municipality has indicated there is a significant inadequacy in the department to that regard.

5.3 Perception of waste separation in North Cyprus

The respondents view on waste separation in North Cyprus were analyzed with questions about how they think the practice of waste separation can impact the country's system of SWM, and whether they think more needs to be done in efforts of waste separation techniques in North Cyprus. 100% of the respondents believe waste separation will be beneficial to North Cyprus, and more needs to be done to in efforts of waste separation practices in North Cyprus. Also, 83.3% of the respondents believe municipal workers do not know enough about waste separation techniques and practices.

5.4 Perception of waste separation in North Cyprus

The perceptions of the SWM department as analyzed in the survey has shown 100% of the respondents agree on three things regarding waste separation in North Cyprus and making it better. All respondents in the survey agreed the municipalities need to do more in focusing on waste separation as a technique of SWM in North Cyprus, the respondents also agree 100% for the municipality to carry out a public programs to educate the public on waste separation practices, also all respondents serif waste separation as a SWM technique should begin with household owners. A significant percentage of the respondents also believe waste separation should not be the responsibility of the municipality alone; 66.7%.

6 Conclusion

The analysis carried out in this paper on the waste separation and sorting in North Cyprus from the perspective of the SWM municipal department has revealed a finding which suggests the municipality workers have a perception of the significance and importance of waste separation as a technique of SWM. The study has also observed findings of the inadequacy of waste separation and sorting in North Cyprus SWM processes. The fin signs of the study have also indicated there is little to no effort in practices of waste

separation in SWM of North Cyprus, with the SWM municipality workers themselves indicating they personally do not practice the technique in their own households. All survey respondents in this study have suggested there is a need for incorporating waste sorting and separation techniques in North Cyprus, as well as the implementation of awareness programs to the public regarding the SWM technique.

6.1 Recommendation

The findings in this study have given an insight into the practices of waste separation in North Cyprus SWM practices. The following recommendations are suggested based on the findings of this study:

- Training the municipality SWM workers on waste separation techniques.
- Developing the SWM framework in North Cyprus to include waste separation practices.
- Providing adequate amenities and facilities for waste sorting and separation.
- Training and awareness programs for the general public on waste sorting and waste separation practices.

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