

WASTE MANAGEMENT SYSTEM AND REVERSE LOGISTICS OF TEŠANJ

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Abstract

The modern society is based on tested strategies in all spheres of its existence. We are living in a quite turbulent and rushing society. Those strategies are reflected in everything, among which we include the strategy of waste management systems which make the society profitable and sustainable. Talking and mentioning waste management is something relative new and it's got popular the last few years in our society on the Balkans. Adequate waste management represents one of the major challenges that all urban environments are facing. We have seen the results that the western countries have done on this field, so the focus now is on the Balkan countries. It is necessary to manage this system in a way that will provide additional values, enable selective separation and recycling. Unfortunately, in this region this is rare, or a small percentage of waste is recycled. Our region is heading towards the EU integration, and one of the field that must and needs to be improved is the field of environment. Therefore, the purpose of this research is to analyze the current situation in waste management systems and green

logistics in the municipality of Tešanj. The municipality of Tešanj is one of the most developed municipalities in Bosnia and Herzegovina. More than 45 000 people are living on the territory of municipality of Tešanj, and more than 12 000 of them are working on the territory. The purpose of this work is to show how a small municipality in B&H is dealing with the waste management. The residents are part of the interest group, which in deed has a lot it's of influence on the efficiency of this system, so the emphasis in this research is precisely on that group. The age of the people who attended the survey was from the age of 15 to 60+. The process of gathering data was done selectively through a survey that was organized online. Some of the media sites from Tešanj gave their help to gather the data including one radio station. The analysis of the collected data confirmed that a large number of citizens take care of their waste, and have information how much it is important to take care about their waste. but also that there are certain problems which are reflected due to the absence of infrastructure, as well as the improvement of cooperation between the citizens and the utility company „RAD“ d.d. Tešanj with the municipality Tešanj as the local intermediary authority. The purpose at the end was to show how all residents in the municipality of Tešanj can and need to take care in their local community about the waste management, and if only one resident engage itself it can lead that more and more people engage, and in the end this leads to a safer and cleaner environment.

Keywords - Waste management system, solid waste, logistics

INTRODUCTION

Reverse Logistics deals with the management and organization of reverse goods flows. In recent times, attention is increasingly devoted to return flows due to rising environmental awareness and environmental interest [1]. Waste management is one of the reverse logistics channels whose management has a huge impact on all participants. Waste represents a direct consequence of the economic growth of society, while its quantity is a direct indicator of the development of its society [2]. Numerous studies have shown that there is a huge gap between developed countries and countries in transition, and in terms of solving problems in municipal waste management, with particular emphasis

on solid waste [3]. The system of collecting municipal waste in the municipality of Tešanj has been greatly improved in recent years. Waste management is a complex process that involves the application of technology and various procedures [4]. There is a visible effort and investment shown by the local community in cooperation with the local utility company "RAD" d.d. Tešanj tries to realize. It is necessary to make rationalization of all logistic processes [5], and thus it is possible to achieve both ecological and economic benefits in the management of waste materials. This, actually, was done in a way in Tešanj where an organized collection of PET packaging appears. According to the available data, the number of beneficiaries covered by the system of organized waste collection in the municipality of Tešanj has been increased and even from distant places outside the central area of Tešanj. In order to determine the current situation in the field of municipal waste management in the municipality of Tešanj, sample surveys were carried out. Data collection and analysis is done online. Approximately 400 citizens of Tešanj municipality responded to the survey. The results have shown that citizens are to some extent satisfied with the cleanliness and utility of municipal waste, but that certain difficulties arise and need to be addressed by educating and raising awareness of citizenship.

MUNICIPAL WASTE MANAGEMENT SYSTEM IN THE MUNICIPALITY OF TEŠANJ

Public Utility Company "RAD" DD TEŠANJ

The basic information about JKP "RAD" d.d. Tešanj was obtained through a direct discussion with the management staff of the company. Basic information on the main collector of municipal waste in the municipality of Tešanj was presented. Utility company "RAD" d.d. Tešanj was founded in 1977 [7]. In addition to the collection of municipal waste and the concern for municipal cleanliness in the municipality of Tešanj, the company also deals with waste water management and winter cleaning and maintenance of roads in the municipality of Tešanj. The company is organized in two sectors, the technical sector and the economic and legal sector. The company is managed by the CEO and two executive directors from both sectors. The company strives to improve its services and to contribute to the development of the social community, i.e. the municipality of Tešanj [8].

MUNICIPAL HYGIENE AND MUNICIPAL WASTE IN THE AREA OF TEŠANJ MUNICIPALITY

As pointed out earlier, municipal waste and municipal hygiene in the municipality Tešanj managed PUC "Rad" d.d Tešanj. Waste is collected from households, and from industrial plants (industry). All local communities belonging to the municipality of Tešanj are included in the process of collection of municipal waste, except for local community Šije, where public company "Vis" Dobjug performs collection of municipal waste. It is very important to note that according to some preliminary data submitted by utility company "RAD" d.d Tešanj, just over 50% of the population of Tešanj municipality is a beneficiary of organized waste collection services. Until a few years ago, waste collection in the municipality of Tešanj took place twice a week. This practice has changed today, and collection takes place once a week. Settlements that gravitate towards the urban part of Tešanj within 6 km like Jelah, Raduša, Bukva, Vukovo have the largest number of users of the utility company "RAD" d.d. Tešanj. Local authorities have launched a project to attract as many as possible beneficiaries of organized waste collection services from all the local communities in Tešanj municipality, and "the new user - the new stock" action continues [9]. Action continues and its first month of activity has shown some improvement, i.e. a slight increase in new service users of organized garbage collection by utility company "Rad" d.d Tešanj. Waste disposal in the municipality Tešanj is done once a week from all local communities in the municipality. The transfer time is from 07:00 am to 03:00 pm. A total of 4 vehicles participate in the process of municipal waste disposal in the area of Tešanj municipality, "Daf" and "Scania" brands as shown in figure 1. In the process of collecting municipal waste, 10 people are engaged in the business.



Figure 1. A vehicle of brand "DAF", which is engaged in the collection of municipal waste

MUNICIPAL WASTE CONTAINERS

In the municipality of Tešanj there is a total of 5529 vessels with a volume of 120 l. engaged in the collection system of municipal waste. These are so called "Ordinary Green Cans" In addition to ordinary cans, 190 containers of 1100 l volume are also in use. In the last couple of years, in cooperation with the municipality of Tešanj, utility company "Rad" d.d Tešanj have also set up 25 recycling stations in the whole of the municipality where recycled paper and PET packaging can be recycled. One of these is the recycling station shown in figure 2 below the text. Recycling stations are located mostly near major generators of logistic flows in the municipality Tešanj, such as near schools, apartment buildings, shopping centers and the like. Certain problems have arisen with the vandalism of cans and containers, but the reactions of the competent authorities have helped the issue to be resolved.



Figure2. Recycling station in the settlement of Simeurale, Tešanj

Basic information on the municipal landfill "Bukva" were obtained during field visits accompanied by municipal sanitary inspector. Landfill has been in use since 1989 and an average of 7,000 tons per year waste is put down. Landfill is ordinary, although it has the characteristics of sanitary landfill. The landfill also has a protective fence, although at the time of field visits several persons were present at the time of unloading waste from the truck as shown in Figure 3.



Figure 3. Municipal Utility Landfill "Bukva" Tešanj

The landfill could be in a better condition, although it is better than other landfills of other municipalities nearby. As it was mentioned, the landfill began to work at the end of 80's in the local riverbed that existed in the past. Soon this place was backfilled with mud and clay. This place where the waste was firstly put off can be seen on figure 4.

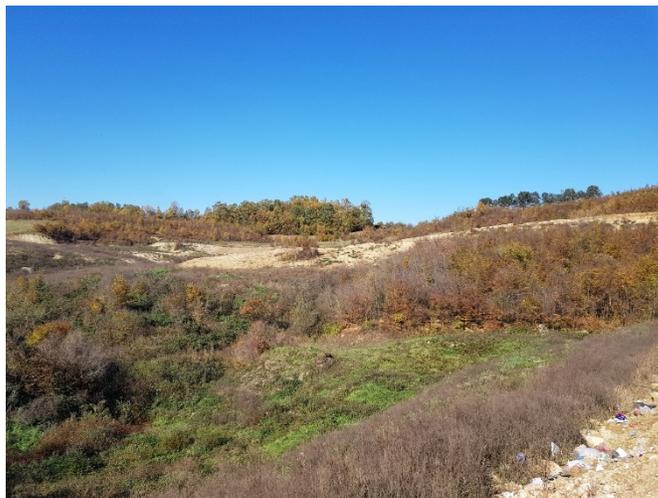


Figure 4 The place where it all began.

EXAMINATION OF CITIZENS' OPINIONS BY METHOD OF INDIVIDUAL SAMPLES – POLL

After the data collection and on-site visits to the local landfill, the opinions of citizens of the municipality of Tešanj concerning municipal waste were examined in their local environment [10]. The survey was conducted in the "google form" program and online data was collected through facebook and local media. A total of 372 persons of different ages and different characteristics, such as sex, place of residence, degree of education participated in the survey conducted in the period from 11/03 until the beginning of December 2017. A greater number of respondents for a short time indicates that this is a current issue which needs to pay more attention to, because it is an integral part of community organization.

AGE OF RESPONDENTS

Figure 1 below shows that the number of respondents was predominantly younger between the ages of 21 and 30 although there is a fairly good response and other respondents of other ages. Mostly of the younger population attended the survey through facebook. Expected, the smallest number of respondents were older, and the reason for this is that there is a limited number of older people using facebook and other online networks through which this survey was shared.

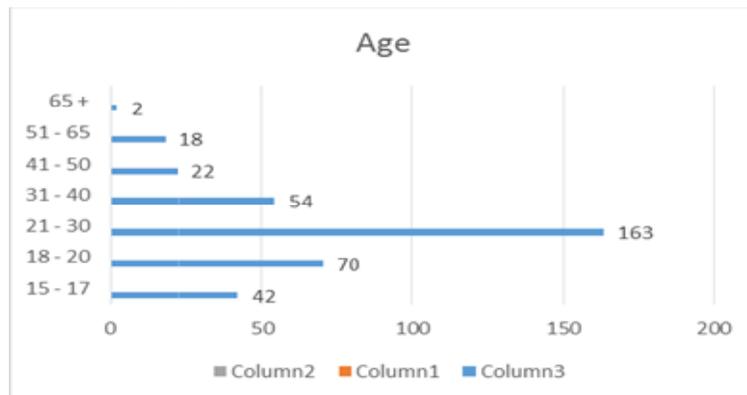


Chart 1 Age of respondents

CLASSIFICATION OF HOUSEHOLD WASTE

When asked whether the respondents classified waste in their household, the advantage was on a side of a person who does not classify waste, not those who do, 43% as seen in the chart 2. When asked why respondents who responded negatively not to separate waste, the vast majority declined to do so because of the lack of recycling STATIONS in their vicinity as shown in Chart 3, that is, the main reason is inadequate infrastructure. A small number of respondents answered that they did not do it for reasons because they did not have time, and the smallest number declined to do so because they felt that it was not necessary to sort the waste.



Chart 2 - The ratio of those who sort the waste and those who do not.

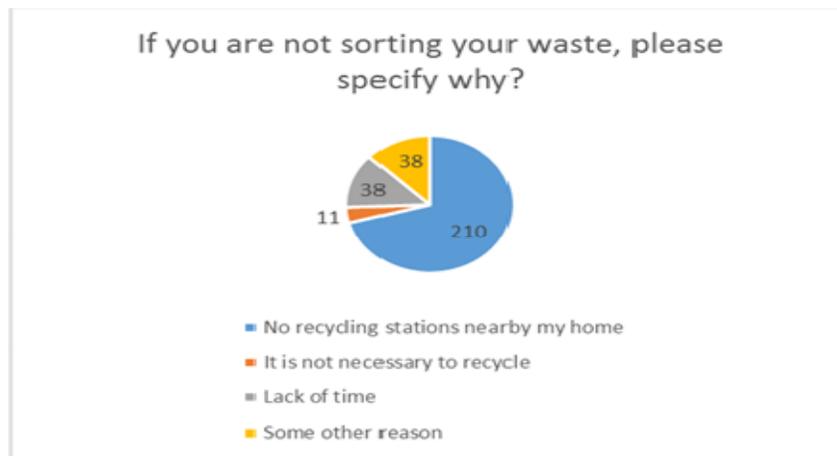


Chart 3 - The reason for not separating the municipal waste of the persons surveyed

TYPE OF CLASSIFIED WASTE

In Chart 4 below, it can be seen which type of waste is most classified by citizens who have answered affirmative the previous question. The largest number of citizens in the municipality of Tešanj sorts organic waste while plastics and glass are in the second place. Paper / cardboard is in third place.



Chart 4 - Type of waste to be classified

RECYCLING STATIONS IN TEŠANJ MUNICIPALITY

As mentioned earlier, in the municipality of Tešanj, a total of 25 recycling STATIONS were set up for use by citizens for recycling municipal waste [11]. Asked about the use of a recycling STATIONS, a certain number of citizens in the municipality of Tešanj responded that they did not use a recycling station, as shown in Chart 5 below, because they do not recycle waste. Also, a number declined not to use them but for unknown reasons. This can be explained by the fact that there are a number of citizens who are not familiar with what is generally a recycling station but also that such a station is not located near their household. Expectantly, a small number of respondents who use or who sort their household waste (recycle). The smallest number of respondents confirmed they did not know what the recycling station was all about.



Chart 5 Displays the prevalence of the use of recycling stations

CONCLUSION

The state of the municipal waste management system in the Tešanj area is progressing. The improvement that the local municipal government and utility company have done is quite good the last few years. While walking through Tešanj, many people says that Tešanj is one of the cleanest place in B&H. The key way to reduce a harmful impact on the environment caused by inadequate waste management is recycling [12]. The media have reported how the schools are engaging the students to gain better attitude to the environment and their behavior. This paper showed that communal waste management in one small town in B&H is functioning. By interviewing citizens were discovered some previously unknown things as in e.g. a large number of citizens wants something useful to do for their community, or are familiar with the advantages of being recycling, but they were not able to do so, because they are confronted with certain difficulties such as infrastructural. While talking to the people many will say that the situation must be better and many are positive to the process of engaging in their local community. There is a need for further interaction of all participants in the community if they want to continue to build quality and preserve the life community. The waste treatment in B&H is going to me more and more better in the future, while the country is moving more and more closer towards the EU integration. Special emphasis continues to be placed on persons

of a younger age to continue various activities such as collecting PET packaging and by their actions through adequate social work make the great merit to the nature in which they reside. Many youths have collected on this way money for their school vacation or similar activity. B&H continues to push towards to EU integration day by day, and certain norms will emerge over time that will entail people who have inadequate access to nature and the community to change it, but the biggest norm and effort is on the individuals in this country if they want some day to live in a much cleaner and better country.

REFERENCES

- [1]<http://cerasis.com/2014/02/19/what-is-reverse-logistics> [pristupljeno 27 decembra 2017]
- [2] Dragičević, S., Butuči, J (2006). Zbrinjavanje otpada u Republici Hrvatskoj – postojeće stanje. Arhiva za higijenu rada i toksikologiju. Vol. 57 No: 3, str 263 – 266.
- [3] Novarlić, B., Stević, Ž., Đurić, P., & Vasiljević, M. Efficiency in organizing transport routes as part of the city waste management: proposal for innovative way of transport. International Journal for Quality Research, (2017). 11(3).
- [4] Kalambura, S (2006). Strategija gospodarenja otpadom i uloga Fonda za zaštitu okoliša i energetske učinkovitosti. Arhiva za higijenu rada i toksikologiju. Vol 57: No.3 pp. 267 – 276
- [5] Stević, Ž., Pamučar, D., Kazimieras Zavadskas, E., Čirović, G., & Prentkovskis, O. The Selection of Wagons for the Internal Transport of a Logistics Company: A Novel Approach Based on Rough BWM and Rough SAW Methods. Symmetry, (2017). 9(11), 264.
- [6] Stević, Ž., Bjelošević R., i Djurić B; (2011). Povratna logistika Doboja – Upravljanje čvrstim komunalnim otpadom. Saobraćajni fakultet Doboje, III Međunarodni simpozijum – Novi Horizonti Saobraćaja i Komunikacija. Doboje, BiH 24 – 25 novembar 2011 god, Doboje: Saobraćajni fakultet u Doboju.
- [7]<http://www.rad-tesanj.ba/index.php/o-preduzecu/istorijat> [accessed on December 22, 2017]
- [8] Ilić, M., Živković, Ž (2011). Kvalitet rada javnih preduzeća grada Beograda po ocjeni potrošača korisnika usluga. 38 Nacionalna konferencija o kvalitetu – 6

Nacionalna konferencija o kvalitetu života. Festival Quality – FQ, Kragujevac, SRB 19 – 21 maj 2011 godine, Kragujevac Srbija.

[9]<http://www.opcina-tesanj.ba/aktuelnosti/novosti/17384-opcina-tesanj-osigurala-besplatne-kante-za-odlaganje-otpada-za-sva-domacnistva> [accessed on December 28, 2017]

[10]<http://www.temidia.com/hr/anketiranje.html> [pristupljeno 27 decembra 2017]

[11]<http://www.rumekon.rs/sr/proizvodi/ekoloski-program/reciklazno-dvoriste.php> [pristupljeno 25 decembra 2017]

[12] <https://www.cistoca.ba/sta-je-to-reciklaza/> [pristupljeno 28 decembra 2017]

[13] Galijašević E., Nunić Z., Alihodžić A. Reverse logistics of Tešanj – Waste management system, TTS Bitola (2018).