

Impacts of Four Seasons In Municipal Solid Waste In Al-Khums City

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Abstract: Municipal Solid Waste has become a crucial environmental issue in the developing countries within the blossoms of the national economy. In the developing countries, with cultural transitions and economic focused development, there are many uncounted non economical risks that actually happen such as waste problems. The government of Libya has established regulations to manage the environmental practices and procedure to protect the Libyan environment from the degradations of its quality. These regulations are implemented step by step by adopting scientific approaches to the MSW system consists of waste collections and waste transportations to the landfill. The aim for this study to know the impact of seasons on MSW to know the different amount of MSW in season. result shows that there is Amount of waste became problem in the households, schools, and restaurants environments. These problems could be handled by providing an MSW specific system to these special environments. The impact of the seasons was also tested. It had been found that the seasons had impacts on the container problems and waste collections in households and schools. And these problems should be managed by providing specific recycling system and disposal system such as compostion and underground combustion machines to the area with highest amount of waste.

Keywords: *Environmental policy, Municipal Solid Waste, four seasons, Al Khums city*

Introduction

Municipal Solid Waste (MSW), the decision by regional government to acquire every existence related to the solid waste, can be provided by the government as one of the tools of power dispersion in order to build governance in the form of environmental service.

Al Khums, a port city in Libya with total population of 420,354 residents, had established MSW within the blossoming economy of this city. The Municipal Solid Waste Management (MSWM) consists of two managerial offices that have been controlling municipal solid waste facilities and manpower system since 1960. MSWM in Al Khums city collects the solid waste from communities and delivers the waste to a regional landfill that becomes the place of waste disposal from 26 districts around Al Khums city. The absence of waste separations and recycling systems makes the waste mounded in this landfill. The workers sometimes burn the waste to reduce the waste when the area of landfill is fulfilled by the solid waste.

The mounding waste in Al Khums landfill had triggered this research to assess the community behaviors and the MSW management system that happened in Al Khums city during four seasons to describe and analyze the MSW situations that had been managed by two management managerial structures.

These offices provide the MSW collection and transportation system, the collectors, the equipments and the infrastructures such as temporary waste disposal containers in every districts. The MSW system also provide a regional landfill for a certain area. Those activities creates new conditions and waste in the residents. Residents started to go to the containers near their houses and throw their wastes into the containers in their districts. The collectors then collect the waste regularly and handle the transfer of wastes from the containers to the trucks before the trucks bring the waste to the landfill. There are total 100 waste collectors employed by the MSW management town in Al Khums city. There are also 80 administrative personnels, 60 inspectors, 100 street cleaning personnels, 70 drivers, and 40 other type of workers in MSW management office in Libya.

By this organizational structure the MSW management system is running deliberately, the national government does not provide the monitoring and evaluation procedure to the MSW activities, thus there are almost no performance or target should be achieved by the MSW management. The most occuring impact from this situation is the mountainous wastes in the landfill.

Municipal Solid Waste

MSW has become a crucial environmental issue in the developing countries within the blossoms of the national economy. By the increasing income per capita, the residents will consume more foods and beverages that will produce more wastes. Products from many factories are usually distributed in the plastic packaging. Convenience stores are using plastic bags to make their customers more convenience on carrying products they have bought. There are also increases on the varieties of the products provided to be consumed. People also have more money to spend. Generally, it could be said that there is a new

consumption culture occurred by the rapid blossoms in economic conditions which is also one characteristic of developing countries. This new consumption culture produces excretive consequences known as wastes. This research, which was performed in Al Khums, a city in Libya, a developing country in Africa, will use MSW in the definition of any existence of solid waste that is acquired and managed by the regional government which consists of domestic and non-domestic solid waste for the simplicity of MSW management system in Libya. In Al Khums, all types of solid waste that come from every building are managed by two management offices that manage waste collectors and facilities such as temporary containers and landfill.

Methods

This research is a descriptive qualitative research within samples from Al Khums residents who lives in the environment of households. Observations on the landfill conditions and the amount of waste had been done .Qualitative questionnaires were spread among communities in the environment of households during four seasons and the conditions of the environments related the solid waste. Interviews were performed also during the spreading questionnaires activities. Samples were

determined by using data saturations that results 94 respondents from the total 420,354 residents in Al Khums. Plastic bags distributions also had been done within the spread of the questionnaires to assess the sorting willingness of the community.

Result and Dissection

Municipal Solid Waste Situations in the Environment of Households in Al Khums

Al Khums lies in the Mediterranean with four seasons as its climatic circumstances. This research assessed community behaviors and MSW related conditions in Al Khums during four seasons to absorb the general behaviors and impacts of seasons to MSW in Al Khums.

Amount of Solid Waste in Four Seasons

Amount of waste was assessed by observations during four seasons to absorb the differences of amount of waste in each season. Table 1 shows the amounts of waste in each season of the respondents from households , schools , offices ,shops and restaurants . The seasons with the highest amounts of waste are the spring with 29,153 kilograms of waste and the summer 28,453

Table 1 Amount Of Waste In Each Season And From Each Community

	Community	Winter	Spring	Summer	autumn
Amount of Waste (in kilograms)	Household	3375	29153	28453	2700
	Schools	5464.8	975.33	0	666
	Offices	139.7813	138.303	172.5	194.499
	Shops	5454	250.92	337.5	216
	Restaurants	168.75	2936.25	1406.25	1406.25

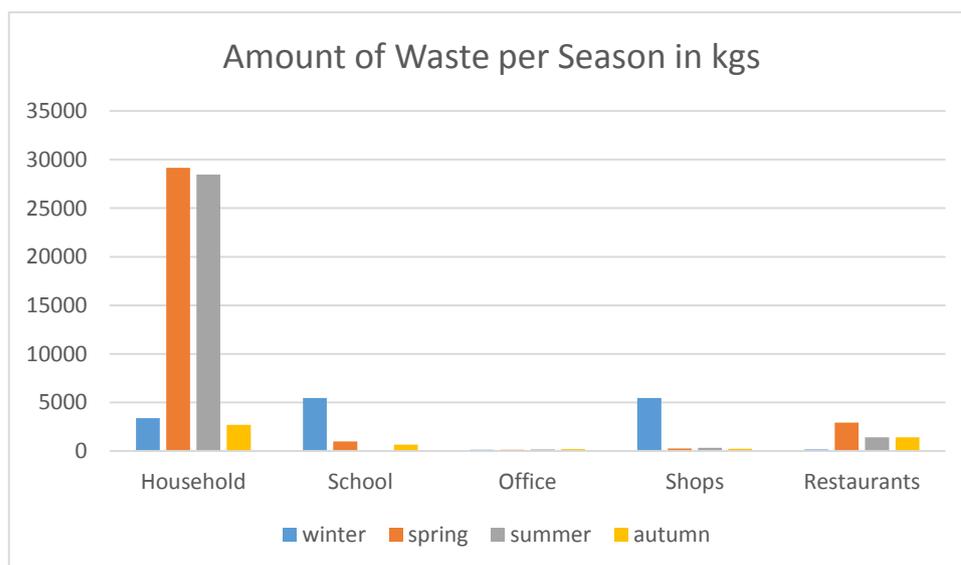


Figure 2 Amount of Waste per Season (byKg)

Table 1. and figure 1 shows the amounts of waste in each season from each community. It can be seen there that households community is the community that produces the highest amounts of waste per season. The seasons

with the highest amounts of waste are the spring and the summer. School and shops produces high amounts of waste in winter, while other communities produce minimum amounts of waste.

Table 2. Types of Wastes in Each Season

Type of Waste in Household	Winter	Spring	Summer	Autumn
Kitchen	47%	48%	40%	42%
Plastic	24%	24%	12%	14%
Papers	9%	14%	18%	16%
others (glass, textiles, metals, rubbers)	20%	14%	30%	28%

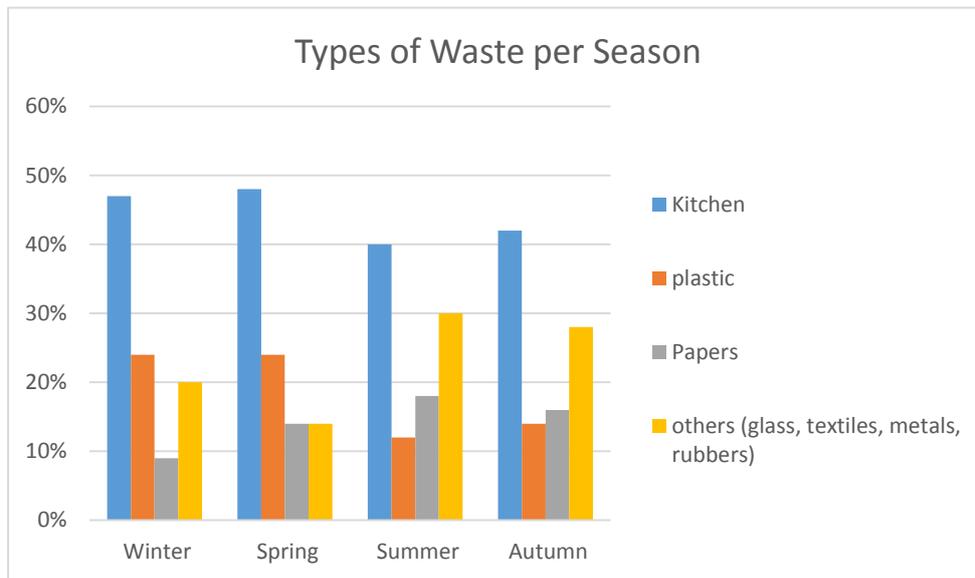


Figure 2 .Types of Waste per Season

Table 2 and figure 2 shows respondents’s experiences on types of wastes. By this table, it can be seen kitchen waste is the type of waste experienced the most. Other types such as plastic, papers, glass, textiles, metals, rubbers, constitute 12-30 % of their experiences of types of wastes in each season.

Seasonal Impacts on MSW in Al Khums City

Seasonal comparison on MSW in Al Khums brought us to understandings that there are impacted by the season.

Table 3 Seasonal Comparison on MSW Related Behaviors in Al Khums City

Variables	Community	The Impacts of Season to the MSW Related Behaviors and Conditions
Types of Waste	Household	Types of waste are constant in each season with kitchen waste (>40 %), plastics (12 % - 24 %), and papers (14 % - 18 %) as the components with the highest percentage. The difference between the types of wastes in the spring season, the summer, the autumn, and the winter season almost has no meaning.
Impacts of Waste	Household	Impacts of waste had been experienced by 48-52 % of respondents. The difference between respondents' experiences on impacts of waste in the spring season, the summer, and the winter season almost has no meaning.
Impacts of Waste	School	Impacts of waste was experienced by 76-79 % of respondents in all the seasons. The difference between respondents' experiences on impacts of waste in the spring season, the summer, and the winter season almost has no meaning.
Season with the Highest Amount of Waste	School	Summer was experienced as the season of the highest amount of waste in autumn which comes after the summer. It means that the respondents answers are valid as their empirical experiences in summer.
Impacts of Waste	Office	Impact of waste was experienced constantly (61-66 %) by respondents in winter, summer and autumn. Its peak was in spring (89 %).
Season with the Highest Amount of Waste	Office	Winter was experienced as the season with the highest amount of waste in autumn, when the respondents had just experienced the amount of waste of all the season.
Impacts of Waste	Shops	Impacts of waste were constantly experienced by 57-68 % of respondents. The least percentage was in autumn (57 %).
Season with the Highest Amount of Waste	Shops	Summer was experienced as the season with the highest waste amount by 38 % of respondents in autumn, where they had just witnessed the last seasons with their waste amounts.
Impacts of Waste	Restaurants	Impact of waste was constantly experienced by 62-87 %, and its peak was in spring.
Season with the Highest Amount of Waste	Restaurants	Summer is the season with the highest amount of waste.

The seasonal comparison of MSW in the Al Khums city showed that the season has meanings on the conditions of the season.

In the summer, the residents are tendentiously provide the better MSW than in the winter and spring.

Conclusions

Harmful Effects of Municipal Solid Waste in Al-Khums

There are also harmful effects that of municipal solid waste system onward in Al Khums. Humans' health is the most aspect that can be affected by inappropriate municipal solid waste by means of the reactions of the chemical condition that of decomposing organic waste and metal contained waste. Leftovers are the second causes of municipal solid waste problems that had been a disturbance for the cleanliness of the area. Although the community shows awareness on their leftover treatments and not leaving any leftover in the waste generators, the varied types of waste have still become problems. The only type of waste that can be re-used by the community is kitchen waste which was the waste with the highest amount. Meanwhile there are also papers, textiles, rubbers, metals, plastics, and glasses as the other uncontrollable types of solid waste for the absence of the recycling system in the community. These types of solid waste are the types of waste that always go to the narrowing Al Khums landfill which need a recycling system to reduce the volumes of waste that are always been transferred to the landfill. Therefore, these types of waste should be well managed by a recycling system to reduce the solid waste transferred to the landfill.

Impacts of Season in Municipal Solid Waste in Al-khums

Seasons had impacts on the amount of waste. There are differences on the amount of waste in each season in every environment especially in the households. During research in all seasons, it had been explained that spring and summer is the season with the highest amount of waste in the households and in the other seasons. Seasons also had impacts on MSW related behaviors when the spring was also found as the season with the best MSW related behaviors among seasons. Further research is needed to know the climatic component of seasons that makes the differences among amount of waste in each season and also MSW related behaviors during the spring.

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