(Surveying of Urban Solid waste generated in MAZAR CITY)

Submitted in partial fulfillment of the requirements of the award of the degree of

Master of Technology

In

Civil Engineering

By

MASOUD GHOLAMI

(18SOCE2020002)

Under the guidance of

ASST. PROF: DEEPAK KUMAR SONI

SCHOOL OF CIVIL ENGINEERING

GALGOTIAS UNIVERSITY

GREATER NOIDA

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Abstract

Mazar city has excessive challenges regarding to Solid Waste Management which effected in various areas such as: environmental, human health and social activities. For this research both methods quantities and qualitative was used in order to identify the waste generated sources and characterize the waste. The research area has selected from random method 1 and 6 districts have been selected as representatives Mazar's 10 districts. In order to determination of sample size, 242 residential household in these two districts. According to this research 48% of waste which are generating contain of food wastes and 11% are plastics. More than 49% responded claimed that the municipal authorities are not able to manage the wastes. There are many reasons for instance unprofessional experts, poor of equipment, out of budges and lack awareness.

Key words: collection, characterize, landfill, waste sources, solid waste management

CERTIFICATE

This is to certify that the project work entitled "Surveying of Urban Solid waste generated in MAZAR CITY " submitted by Masoud Gholami **(18SOCE2020002)** to the School of Civil Engineering, Galgotias University, Greater Noida, for the award of the degree of **Master of Technology in Civil Engineering** is a bonafide work carried out by him/her under my supervision and guidance. The present work, in my opinion, has reached the requisite standard, fulfilling the requirements for the said degree.

The results contained in this report have not been submitted, in part or full, to any other university or institute for the award of any degree or diploma.

(Mr/Ms Name of guide)

Asst. Professor

Guide

(Prof. (Dr) Manju Dominic)

Dean,

School of Civil Engineering

External Examiner

DECLARATION

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Date: **(MASOUD GHOLAMI)**
Place: **18SOCE2020002**

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ACRONYMS AND ABBREVIATIONS

SWM	**solid waste management**
CO2	**carbon dioxide**
NEPA	**National Environmental Protection Afghanisatan**
CO	**Carbon Monoxide**
EIA	**Environmental Impact Assessment**
MA	**Municipal Authorities**
CBOs	**Community Based Organization**
BOD	**Biological Oxygen Demand**

CHAPTER 1

INTRODUCTION

GENERAL

Life standards, urbanization, raising population and economic improvement have caused raising the waste utilization, volumes and types of wastes. MSW generation rates were affected by many factors like migration of people to urban areas rapidly, life standard increased, utilization of different types of goods and finally, developing of economic. One of the main biggest challenges at the moment which the world is treated is poor Solid waste management which need for globally corporation. (1).

In many developing countries the reason of solid waste management is lack of knowledges, rapid urbanization and poor management of municipal authorities and governmental office. However, the big amount of budges are spending in this area the condition of solid waste management are getting worse and out of control day by day.

The first direct impact of poor solid waste management is on environmental and human health. If not taking action.

Generation, collection, transportation, recovery and disposal are the main process of Municipal solid waste management in order to conserve the environmental, human health and save lives. (2). The next definition is solid waste management and systems is an accurate technologies and mechanisms included in the generation, collection, storage, processing, transfer or transport and disposal and solid waste set up to decrease waste at the lowest possible (3). In addition, reducing risk which are influencing human health and environment.

Cities habitats and rash areas of developing and undeveloped nations generated MSW is at best collected dumped in arbitrary dump sites that probably is non standards. Such disposal needs collecting, transport and dumping into the nearest land. Which in other develop countries MSW is dumped in water bodies and wetland and part of the wastes is burning to minimize its volumes. Such practices have their adverse environmental impacts ranging from polluting the natural resources and the ecosystems to the building of health problems which might turn into long-term public health problems(4).

Mazar city is located in north zone of Afghanistan which is one of the historical province of Afghanistan. The capital of this city is Mazar Sharif which one of the largest city in Afghanistan. It is a developing city which the construction is in progressing. Geographical location: this city with the high of 357 from the ocean, 36. 7 latitude and 67. 3 longitudes is located in the country. From north has border with Uzbekistan and Turkmenistan, from east with Samangan province. This city is divided to ten districts and 36.7 km planning zone and 20 km unplanned zone. In addition majority of the population has been located in east and south of the city

Raising the efficiency of solid waste management system in Mazar city needs decreasing waste generation at its sources. Promoting public awareness. Private sector participation and NGOs in urban waste management, and using new technologies in this management system. Furthermore, it is essential to demonstrate the recent management of solid waste by monitoring the effectiveness of the solid waste by doing the questioners and provide the best methods in order to solid waste management in Mazar city from the majority sense and propose to the responsible organizations in order to replace to accurate method or continue the current methods. The scope of the research is to review the current condition of Mazar solid waste management in order to set up a sustainable waste management. In addition the main purpose of this study is to identify the sources of wastes and characterize the types of waste in order to suggest an appropriate methods for managing wastes in this city.

1.1 SOURCE AND CLASSIFICATION OF WASTES

Solid waste is a source of pollution that comes in importance after water Pollution and air pollution. Sources of solid wastes in a community are, in general, related to land use and zoning. The principal sources of solid waste are domestic (Residential), commercial, industrial, and agricultural activities. Although any number of source classifications can be developed, the following categories are the most important:

1.1.1 CLASSIFICATION OF WASTES

a) Residential, Commercial, Institutional

b) Industrial

c) Agricultural

d) Hazardous waste

RESIDENTIAL, COMMERCIAL, INSTITUTIONAL

Household Waste, also defines as domestic Waste or residential Waste, is also disposable materials produced by households. This Waste can be classify of non-Hazardous Waste and Hazardous Waste. Non-Hazardous Waste can consist food scraps, paper, bottles, etc. which can be recycled or composted. Like Hazardous Waste include batteries and household cleaners which can be generated from different of households. It is important that Hazardous Waste is organizational, handled and manageable in a safe manner to ensure that they are disposed properly so they do not cause harm and make challenges.

INDUSTRIAL

Those types of wastes which are generated by industrial process are called industrial wasted which consist any material that is presented useless during the process of manufactures like that of factories, industries, miles, and mining operation. Different items of waste include dirt and gravel, masonry and concrete, script metal, oil, solvents, chemicals, script lumber, even vegetable matter from many sources like restaurants. Solid waste is also type of industrial waste, liquids and gaseous.

(c) AGRICULTRAL

Agricultural waste as clear which the source provided is from land operations and pantry
Mostly, agricultural wastes are dangerous and having high risk for human being and environment like fertilizers, pesticides and herbicides

(D) HAZARDIOUS WASTE

Hazardous wastes have known as threats for the human health or environment

1.2 OBJECTIVES OF STUDY

1. To characterize the waste generated in Mazar city.
2. To identify the sources of waste generated in Mazar city.
3. To identify the solid waste management practice existing on the city.
4. To examine the current solid waste management system of city and describe, if it sufficient?
5. To provide different practices/ new technologies of solid waste management in city.

1.3 NEED FOR STUDY.

Solid waste management (SWM) is excessive challenges in the view of health issues and sustainable development. It develops the outbreak of diseases such as cholera and also provides opportunities for employment. Local authorities have challenges in solid waste management due to lack of resources, unspecialized employer, rapid population growth and rural urban migration.

Poor solid waste management is the cause for challenges over the world which Afghanistan is not exceptional particularly Mazar City. Mazar generates massive amounts of waste which is poorly disposed of. Solid waste collection is very unpredictable and some cases some suburbs can go for more than a month without receiving such a service. The proliferation of illegal solid waste dumpsites in and around Mazar is making serious challenges in terms of air, water and land pollution .This has raised the risk of spread of illnesses such as cholera. Such practices are inconsistent with sustainable development. The existing dump site, which is an open dump site, can no longer cope with the increasing demand of the waste generated as the population increases and commercial activities such as vending are sprouting in many parts of the township. The loose papers and plastics from the open dump site are scattered all over the area by the wind which significantly reduces the aesthetic value of the area.

In Afghanistan due to lack of studies in solid waste management the government has been faced in many challenges regarding environmental issues and management of wastes. This research will be one of the most significant paper in order to provide comprehensive solution in consistently managing wastes in this city. Providing data to making accurate plan for the wastes

of the city and also will open the door to next researcher who are interested to having research in this areas.

1.4 CITY INFORMATION

Mazar City, such as many others cities in the world is facing with environmental challenges due to fast raising population and immigration of people from villages to city. Balkh is the center of this city. The total land in this city is divided into planning areas around 36.7 km and 20 km non- planning areas. The majority of population has been located in west and south of the city.

Number	Districts	Family	Population
1	**First**	**23**	**79276**
2	**Second**	**32**	**66859**
3	**Third**	**19**	**36196**
4	**Forth**	**18**	**35154**
5	**Fifth**	**46**	**153380**
6	**Sixth**	**16**	**60650**
7	**Seventh**	**37**	**67576**
8	**Eight**	**23**	**27334**
9	**Ninth**	**28**	**85096**
10	**Tenth**	**32**	**85096**
11	**Total districts**	**274**	**696617**

Table 1.1: Districts information of Mazar city

Mazar city has been divided in to ten districts according to municipal authorities which in each districts the population separated. The above figure the number of people that are living in diver's districts is showed. However this data is provided the authorities the majority of people are saying that this is not accurate data. More than this number of people are living in this city.

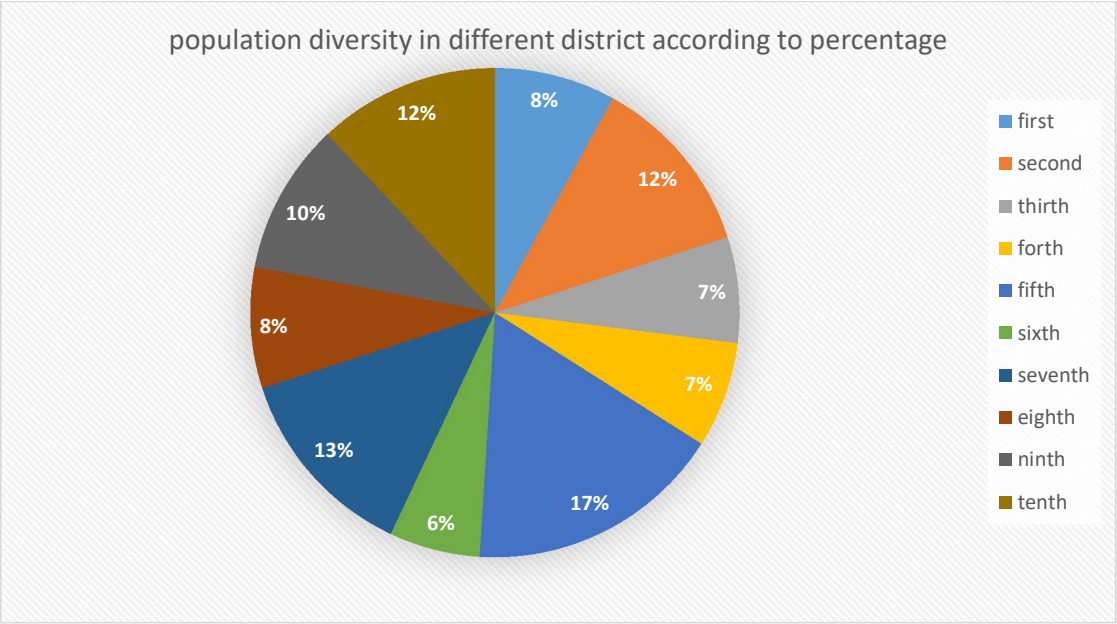

Figure-1: population separation in various districts according to percentages

According to the above figures (1) the population of Mazar city that separately living in different districts. The largest amount of people live in first, second and tenth district.

According to this data we can say that most of the people are living surrounding city and interested to habit nearby city and center of the city.

CHAPTER 2

LITERATURE REVIEW

2.1 SOLID WASTE MANAGEMENT EFFICIENCY IN KABUL CITY

Mohamd Salihi ET, (2015) studies the solid waste management efficiency in Kabul city follow to excusive problem in the management of solid waste, which does not comply with environmental standards. This research is contained both methods integrating both quantitative and qualitative, was utilize to monitor the efficiency of solid waste management in Kabul city. The residential houses in 7 and 10 districts of Kabul city are selected as representative areas, which form the basis of this research. Based on the evaluation of sample size, 380 and 375 residential units were considered, but in district 10, about 77 questionnaires were left undistributed. Besides, site visits for further confirmation were conducted. Results showed, the big amount of respondents expressed that the functioning and management of wastes by the municipality is ineffective and also the provided services are insufficient. More than 72% of respondents showed that the municipality is lack of public awareness and there is no a source reduction's program within the municipality. More than 56% of respondents said that the people join in waste management. In addition, they pointed out that lack of professionals and skilled workers, lack of standardized equipment and proper roads in the unplanned and slopes areas for collection and delivery of services and also lack of public cares and attention to the environment are the factors limits effective solid waste management in Kabul city. Based on the findings, it is suggested that a strategic plan with short-term and long-term goals with flexibility property and ability to up-to-date should be prepared as regarded of current state of the nation.

(Source: irjet.net)

2.2 ASSESSMENT OF SOLID WASTE MANAGEMENT BY VARIOUS METHOD IN GLENDALE IN ZIMBABWE

Nhamo Marunga has completed this article in 2015. The scholars used case study research design in conjunction with mixed methods research in the study. Both qualitative and quantitative methodologies were used to collect data. The destination population for the research consisted of residents of Valley, Westville Park and Sisk, council authorities, Environmental Management Agency (EMA) officer, waste collectors, and members of community based organizations (CBOs) and the environmental health officer. The total people was 569 and the sample size was 235. Applied systematic sampling was employed to select 220 households and the rest except CBO members were picked using purposive sampling. CBO members were chosen using convenience sampling. Data were collected using self-administered questionnaire, interviews, focus group discussions (FGDs), observations as well as secondary data. Qualitative data was analyzed thematically while quantitative data was analyzed using statistical package for social sciences (SPSS) version

16.0 As well as Pearson Chi square test. The results of the study indicated that solid waste management in Glendale is inefficient. Four and half tons of waste is produced per day in Glendale but only 2.0tonnes is collected and 2.5tonnes is left uncollected. It was considered that the waste is mainly decomposable organic. There is widespread illegal dumping of waste, inconsistent collection of waste, insufficient provision of receptacles and the council's official dump site is illegal. The council dumped waste on an illegal dumpsite characterized by open dumping and burning of waste. It was also noted that the waste was not divided according to type at the source. The study recommended a raise in awareness campaigns to grantee a change in the attitudes of the residents especially in connection with managing sanitary waste. Moreover, the council should play its part by collecting waste frequently by increasing the size of its fleet for waste collection. The decomposable organic waste should also be used for generation of biogas.

Source: website

3.3 A SURVEY ON SOLID WASTE GENERATED AT A SOUTH INDIAN UNIVERSITY CAMPUS

Because of the rapid growth of population and standard of living the Solid waste management has become a worldwide challenges. The inaccurate management of Solid waste may cause a hazard to economic, living being and environment. The problem of solid waste management is at the initial stage at South Indian University campus. A comprehensive survey has done regarding the method of practices associated with sources, quantity generated, collection, transportation, storage and treatment and disposal of solid waste in South Indian University campus. The data were taken from field visits, interacting with people and questionnaire. The survey data reveals the existing system of solid waste management practices followed in South Indian University campus.

The solid waste management is an important aspect of community and environmental management. such as another infrastructural service that has come under considerable stress in urban and rural areas, the solid waste management(SWM) is most neglected infrastructure either by community or by concerned agency or authorities. In particular region of our nation, the free illegal disposal of solid waste has reached its exceeding capacity, and even local authorities are challenged to take a decision (Maity et al., 2012). Every time the management of solid waste needs standard infrastructure, maintenance, and regular up gradations. The SWM becomes uneconomical ordinarily because of unplanned and fastest changes in the society (Sharholy et al., 2008). Poor collection and inadequate transportation and awareness are reasons for the accumulation of solid waste every nook and corner (Gidde et al., 2008).

The solid waste management at South Indian University campus is significant parts and needs to be integrated soon. The collection of solid waste must be completed scientifically. Illegal dumping of solid waste should be stopped, and tackle action should be taken on such activities. Segregation at source is the best practice that can provide better way and significant component at solid waste management. It is necessary having awareness to the residing people within the campus about minimizing waste and cultivating a culture on separating dry and wet wastes. The disposing of solid waste may be done in a scientific sanitary landfill and the recyclable material can be separated and sent to recyclable units. A systematic approach must be adopted for segregation of waste at source, a collection of waste, timely and proper transportation of waste and disposal of waste. Emphasis focus on the initial segregation and collection of waste from the doorstep from employee residences. The better management of biodegradable waste can reduce the waste disposal by 55–75% at present.

CHAPTER 3

METHODOLOGY

3.1 STUDY DESIGNE

This study has conducted in Mazar City from January, 2020 to April, 2020 by Masoud Gholami student of Galgotias University to figure out the classification of waste, amount of waste and sources of waste generated in this city by using qualities and quantities methods.

3.2 RESEARCH APPROCH

The main aim of this research was to characterize the types of wastes and identify the sources of the wastes generated.

3.3 sampling techniques and data analysis

In order to being more effective of solid waste management this research from both methods quantitative and qualitative were applied in Mazar city. District 1 and 6 have selected as representative areas which households were selected in order to taken sample. Therefore, each individual house selected. The scope of this research is household areas and the other areas like hospital, commercial were not considered in this research.

Residential areas were selected based on socio-economic of in habitants planned and unplanned parameters of the regions. In district 1 the number of families were 4562, and 6 district were 2195 which from systematic methods was used. From each districts 16 families were selected in order to taking sample. Therefore, from every family the sample has been taken for 8 days continuously, which the whole sample which has been taken is 256.

House No	Family	Day2	Day3	Day4	Day5	Day6	Day7	Day8	Total(kg)
1	4	1.38	1.66	1.41	2	1.79	1.41	1.38	11.03
2	5	1.84	1.58	1.97	1.67	1.45	2	2.01	12.52
3	2	0.9	0.88	0.8	0.91	0.01	0.68	0.7	4.88
4	6	2.06	2.5	0	2.46	3	2.14	2.78	14.94
5	3	1.22	0.98	1.15	1	1.1	1.18	1.09	7.72
Total waste		7.4	7.6	5.33	8.04	7.35	7.41	7.96	51.09
Total people		20	20	14	20	20	20	20	
Per cap. Generation rate		0.37	0.38	0.38	0.4	0.36	0.37	0.4	0.38

Table 3.1: sample collection from the study area

Average per capita generation rate:

- 0.38 kg/cap/day
- 0.38 kg/cap.day * 700000 cap = 266000 = 266 ton /day

According to the table no 3.1, the data collecting has been collected from different places and sample have taken regularly form the first day up to eight days which the day first is removed.

Each day while the sample collected then each of them weighed and record it information of each day and the date and time has been noted down.

3.4 study area

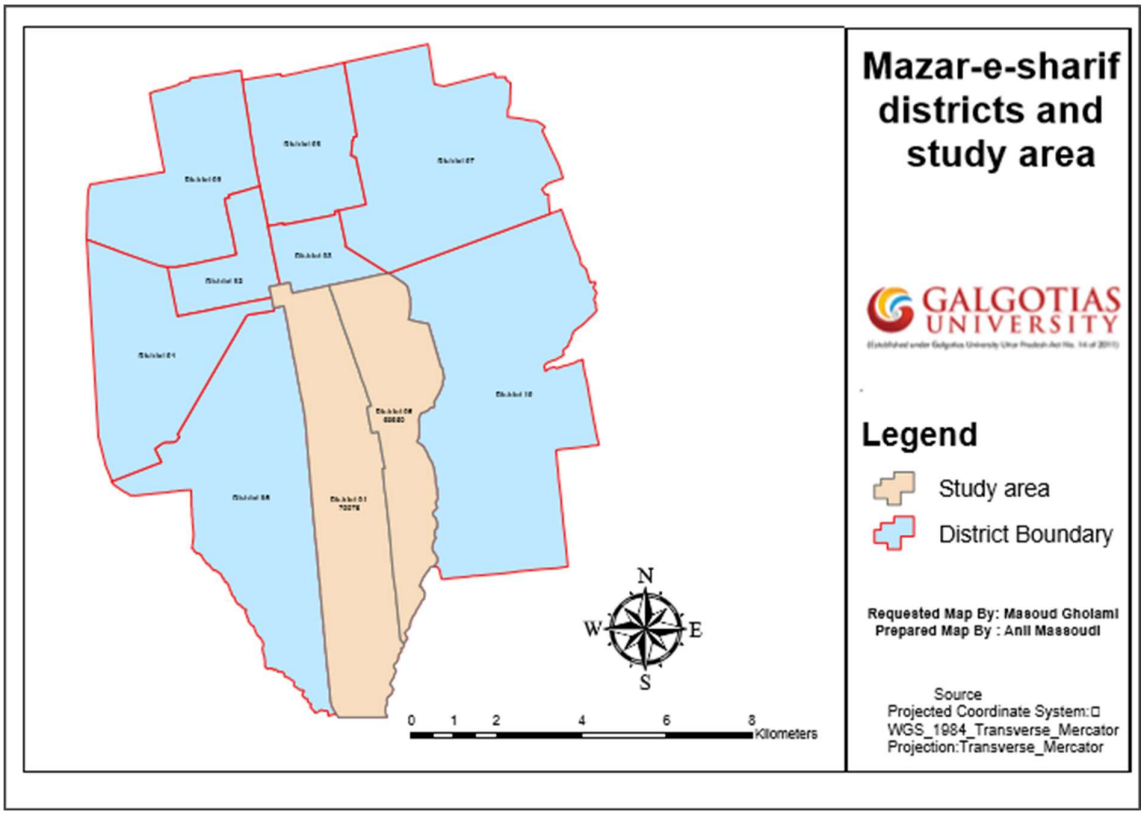

Figure.2: information of study areas in the city

Figure.2 has bolded the study area which has been selected as representative of tenth districts of Mazar city because covering all the district was too much difficult and costly I have select two divers district base on high standard and low standard of life to present the all district accurately and appropriately. In this GIS map the first and sixth districts has been known the specific areas.

Chapter 4

Results and Recommendations

4.1 sources of waste generated in Mazar city and characterize the wastes

Waste production is directly depends on consumption. While the population were not growth wastes was not a big deal. Population growth, traveled to cities, life standard development and increasing the utilization of goods by urban people were the cause of wastes issue in Afghanistan especially big cities. Various sources generated wastes in Mazar city.

Source of wastes	Venue of wastes generated	Types of solid wastes
House hold		
commercial		
urban		
Industrial		
Opened place		
Treatment plan		
Agriculture		

Table.4.1: information about the sources of waste generated and its types

Sources and types of wastes generated in Mazar city.

In the below charts has given details about the sources and classification of wastes generated in this city.

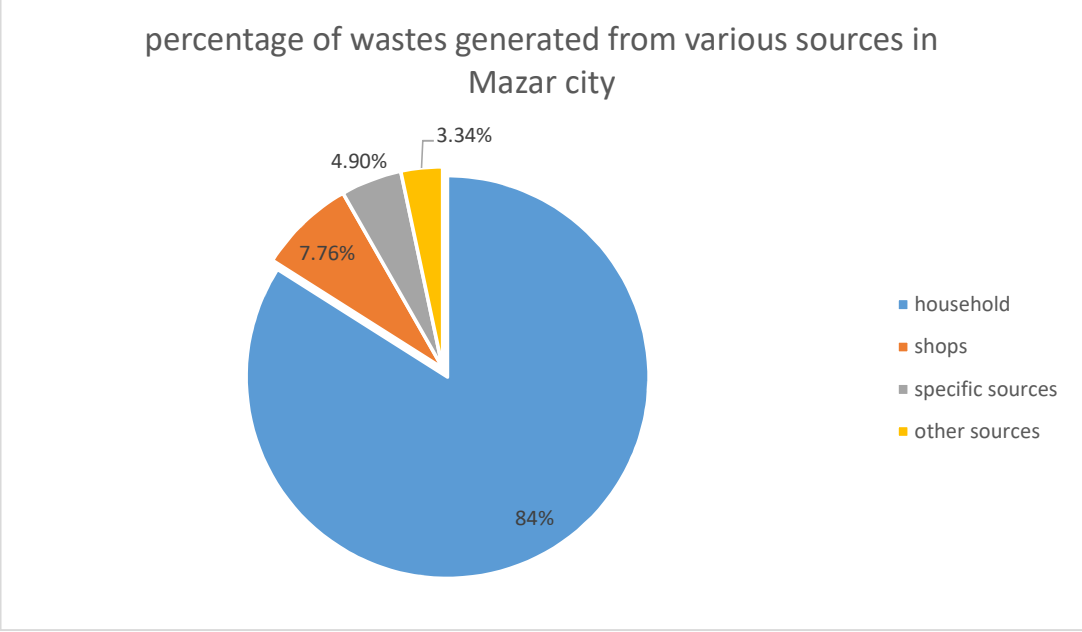

Figure.3: percentages of wastes generated from various sources in the city

Source of wastes	Venue of wastes generated	Types of solid wastes
House hold	different types of houses like flats, apartments	rubbish, organic, food wastes, plastics and etc
commercial	stores, malls and shops	chemical waste, electronic waste, demolition waste
urban	commercial high places	commercial high place
Industrial	factories different types	toxic materials
Opened place	parks, streets etc	plastic bottles, food wastes
Treatment plan	waste waters	waste water wastes
Agriculture	gardens	corn stalks, sugarcane bagasse, drops

Table-4.2: detailed about the types of wastes generated in the city

Solid waste generated in the city

Type of waste	estimated waste generated (kgs)	percentage
Food waste		48.2%
Plastic		8.2%
Paper and cardboard		3.5%
Glass		1.8%
Dust		14.7%
Garden trimming		2.2%
Lather		0.8%
Toxic waste		11%
Construction waste		3.2%
Metal		0.6%
Plastic waste		1%
Textiles		4.8%
Total		100.00%

Table-4.3: types of wastes according to percentages of each items

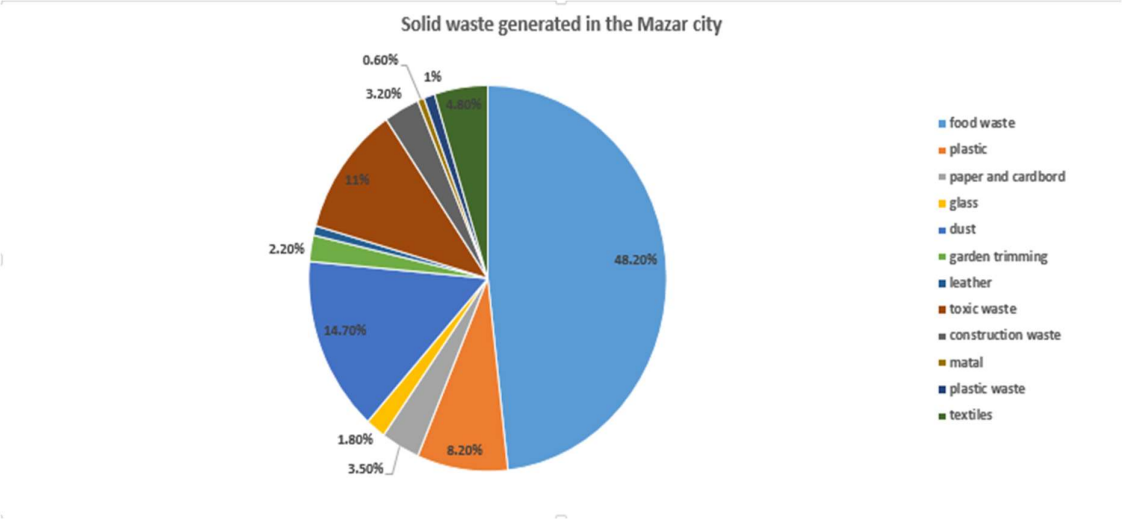

Figure-4: types of wasted generated according to percentages in the city

The figure.4 has been showed the characterization of municipal waste which are generating each day in Mazar city. The results is demonstrating that the largest volume of waste contain food waste, dust and plastic from the sources.

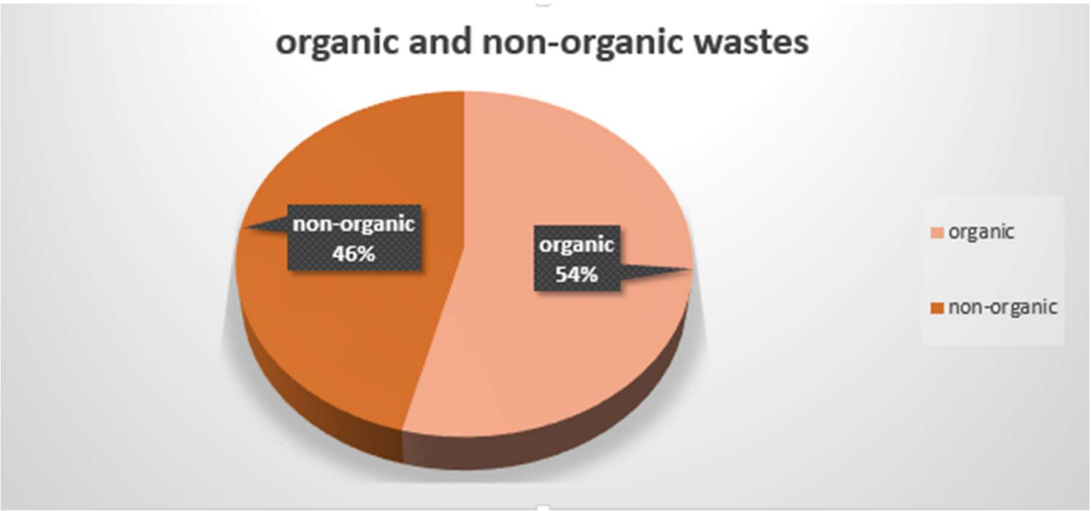

Figure-5: characterize of waste into two major parts such organic and non-oragnic

The total composition of solid waste generated in Mazar city which contribute is food waste 48.20% (figure 6). The big amount of solid waste composition is food waste following with plastic, paper and cardboard, glass, dust, garden trimming, leather, toxic waste, construction waste, metal, plastic waste bottles and textiles. The research will help the municipal authorities to set up an accurate and appropriate plan in order to manage the solid waste. Therefore, this might help the authorities to convert the solid waste into energy especially into biological

process because the majority of waste contain food waste or organic waste that could be useful for agriculture purposes. In addition, this paper will provide awareness to the government to taking action about recycling and give chance to other private and NGOs to fund on this project.

4.2 conclusions

The most important issue for solid waste management in Mazar city should be upgraded soon. One the significant stage is collection process which has problems and not accurate and affordable for this city. Segregating solid waste at the source of generation could be the best option at the moment. Providing awareness for the communities to minimize the generation of waste and segregate dry and wet wastes. The disposing of solid waste might be done in a scientific sanitary landfill and the recyclable materials can be divided and transfer to recycle units. The segregation system should be applied at the sources of generation of waste. Accurate biodegradable waste could be decreased the waste disposal 55-75% at the moment. Finally, requested from the municipal authorities of Mazar city to follow these significant solutions which provided appropriately.

4.3 Recommendation

- Continuous minimization and decreasing the volume of (MSW) municipal solid waste production and prevention of its generation at source
- Segregation of toxic and hazardous waste from household's wastes
- Apply comprehensive and waste management system in compliance with the management step by step
- Preparing different types of training and raising the awareness of communities and all local people to getting action for the management of wastes which are providing each single days and giving knowledges of segregation from the sources. And find out the recyclable waste from the dump site.
- The management and evaluation of wastes should be controlling by private sectors and monitoring by municipal authorities
- According to the results of this research more than 50% of Wastes contains organic waste which can be useful and manageable of promoting market's economic. Best option to encourage the private companies to fund on this project.
- Providing facilities for communities all over the city by noted specific places for each district to transfer the wastes and supply different containers and rubbish in various places specially those areas which have more people are meeting
- Coverage of solid waste management services at the household level and the easy access of people to such service
- Promoting the operation of municipal authorities staff and giving training how they can collect effectively all the waste from the sources and houses
- Identify the appropriate place for landfills and deposit waste standardly zero of risk
- Existing waste management regulations and their executed should be evaluate and amended urgently
- Economic instruments such polluter pay principles and services users are also essential in waste management process should be considered

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