MUNICIPAL SOLID WASTE MANAGEMENT OF GAZIPUR CITY CORPORATION

A Thesis Submitted in Partial Fulfillment of the Requirements for the Bachelor of Science Degree in Civil & Environmental Engineering.

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NOVEMBER, 2014

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APPROVAL

This is to certify that the thesis submitted by Habibur Rahman Khan, Tanvir Alam and Md. Mahadi Hasan entitled as "Municipal Solid Waste management of Gazipur City Corporation " has been approved, in partial fulfillment of the requirements for the Bachelor of Science degree in Civil and Environmental Engineering.

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DECLARATION

We hereby declare that the thesis entitled "Municipal Solid Waste management of Gazipur City Corporation", has been performed by us and this work has not been submitted elsewhere for reward of any degree or diploma (except for publication).

NOVEMBER, 2014.

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ACKNOWLEDGEMENT

First of all total thankfulness goes to Almighty Allah, the Lord of the Universe. We are truly blessed to have had the experience to do this type of research, and have been blessed with the people/events that have taken part in my life to make this research possible. Thank you, Almighty, for being kind enough with all these things! We've been given more blessings than we deserve and it is my intention to share our abundance with the world!

We would also like to thank our family, and especially our parents, for believing in us and always showing unwavering love and support. They have sacrificed themselves for the sake of their children's advancement and prosperity and have been the embodiment of love in my life. Because of them, we have much to give, and it is our life's purpose to do so.

We must express our humble gratitude to our respected supervisor Prof. Dr. Rezaul Karim, for his generosity and kindness, without his cooperation this thesis would never be completed.

We would like to thank all the officers and other staffs of Gazipur City Corporation for their sincere and spontaneous assistance. In the end we would like to thank each other for our perseverance and group spirit which helped us make the research a success.

ABSTRACT

Municipal solid waste is the waste that is generated from households basically kitchen waste with other household wastes. Municipal solid waste management denotes the process by which the waste of an area being disposed and managed; sometimes treated as this could be hazardous to the human life. Municipal solid waste has become a great problem in the developing countries specially in the urban areas due to rapid growth of population. The amount of waste generation in the major cities of Bangladesh namely Dhaka, Chittagong, Khulna, Rajshahi, Barisal and sylhet is total 7690 tons daily which is a hige amount to manage. The per capita generation of municipal solid waste is ranged from 0.327 to 0.485 kg/capita/day while the average rate is 0.387 kg/capita/day as measured in the six major cities. Many studies have been done on the management of municipal solid waste but none in Gazipur city. So we conduct a study based on the municipal solid waste management in Gazipur city. This study has been found that total 1747.12 tons of domestic solid waste are being generated daily. The responsibility of the management is of then is mostly an authority in common system and a few on the house owner. Of the total quantity, 50-60 percent is collected efficiently and the rest is left. The moisture content (45% to 55%) by weight are much higher than that of the waste in industrialized countries. The domestic solid waste of Gazipur City Corporation has a high organic content (85% to 95%) and has a lower proportion of combustible matter. This waste, which remain uncontrolled, are dumped in open spaces, street and drains, clogging and drainage system, which create serious environmental degradation and health risk. There are a few dumping spaces a few kilometers away from the city corporation. In spite of having these dumping zones, the space is not sufficient enough. The waste which have market value, are being reclaimed or salvaged for recycling. The unmanaged solid waste should be collected and managed properly and the authority should be more concerned about that feature for making the city healthiest and livable.

Contents

CHAPTER ONE

INRODUCTION

1.1 General

Municipal solid waste management is the waste that mainly generated from household specially the kitchen waste with other household waste. Municipal solid waste management denotes the process by which the waste of an area being disposed and managed sometimes treated as this could be hazardous to the human life. Municipal solid waste has become a great problem in the developing countries specially in urban areas due to rapid growth of population. Economic development, urbanization and improving living standard in cities have to lead to an increase in quantity and complexity of generation waste. Rapid growth of population and industrialization degrades the urban environment and places serious stress on natural resources which undermines equitable and sustainable development. Solid waste can be categorized as the recyclable materials, toxic substances, compostable organic matters and solid waste. The environment and human health face a severe impact due to the unscientific disposal of solid waste. Due to implementation of modern solid waste management practice both the public health and the quality of the environment are benefited directly and substantially.

Bangladesh is a densely populated country, country's population will be about 17 crore by 2020 (BBS,2001; population Council,2010). In countries like Bangladesh Municipal solid waste creates an incredible environmental hazard and social problem in city lives. A massive volume of waste is generated every day in the city areas. A total of 7690 tons of Municipal solid waste generated daily at the six major cities of Bangladesh namely Dhaka, Chittagong, Khulna, Rajshahi, Barisal and Sylhet as estimated in 2005. Rapid growth of population, Urbanization and Economic development are the most important factors that lead to the generation of solid waste in Bangladesh. The per capita waste generation of municipal solid waste was ranged from 0.325 to 0.485 kg per capita per day while the average rate was 0.387 kg per capita per day as measured in six major cities of Bangladesh.

Municipal solid waste ally converted into a serious problem for is gradu developing country like Bangladesh. As a developing country huge amount of solid

waste is generated everyday in the municipal area of bangladesh but most of them are management practise causes various not managed properly. For unplanned solid waste problems in human life. Inherent human desire in resources consumption governs the waste generation capacity. People are growing rapidly in municipal areas and increase .solid waste for their daily resource consumption

Municipal solid waste quantity and composition therefore depend on population density, source diversity and the income of the people in the locality. With the increase in population, economic activities and the income the Municipal solid waste quantity and composition including the non-biodegradable and hazardous waste is bound to increase. The evolutionary waste quantity and characteristics accordingly challenge the municipal authorities in management, demanding more and more resources and technological capability. In developing countries where resources and capacity is constrained, the challenges thus become serious. (Penjor,2007)

Most municipal corporation of developing countries are not able to handle increasing quantities of waste and a significant portion of wastes are not properly stored, collected or disposed in the proper places for ultimate disposal due to lack of enthusiasm, consciousness, loyalty as well as money. There is a need to work towards a sustainable waste management system which requires environmental, institutional, financial, economic and social sustainability.

Many studies have been done previously on the management process and system of solid waste of different major cities but none on Gazipur city. Now a days it becomes an essential need for Gazipur city as it is one of the most densely populated area due to vast industrialization.

1.2 Objective of the Study

The objectives of the study show the works those have to do to make the study effective. Here, in this study we have to estimate the solid waste generation rate, composition of the collected solid waste, dumping and management process, tried to visualize the future scenario of the waste and suggested better ways to solve the waste management problems.

The study has been conducted to fulfill several objectives as mentioned follows:

- ✓ To estimate the amount of total waste generation of Gazipur City Corporation through zone wise survey.
- ✓ To find a proper, better & develop scenario for future years based on present situation.
- ✓ To find the amount of waste generation in the future with the help of population data.
- ✓ To find the composition of municipal solid waste produced daily in Gazipur City Corporation
- ✓ To identify the problems of solid waste collection and transport system
- ✓ To visualize the present status of solid waste collection transportation system of the Gazipur City Corporation

1.3 Scope of this Study

This study has shown us the condition of the municipal solid waste generation, collection and help us to visualize the future condition of the scenario of the municipal solid waste.

Here zone wise municipal solid waste samples had been collected and dried in the sun to find the moisture content and the composition of the samples. It also helped us to find the waste generation rate. Collection data had been collected from the GCC.

All these data helped us to determine following:

- ✓ Evaluation of the present scenario of the waste generation
- ✓ Find the future scenario based on present condition
- ✓ Help to fight the present waste generation problems
- ✓ Preparation to solve future waste related problems
- ✓ Help the environment more healthier

1.4 Limitation of the Study

There are some limitations in our study. We have taken data from a few amount of houses of different zones of Gazipur City Corporation due to short time period. As this study is totally depended on the data collected by questionnaire survey, it would be more easier to find the most accurate result if more household data is taken for a longer period. It is because this household data may vary in different time period.

Gazipur City Corporation is recently turned as a city corporation. They don't have sufficient official document on municipal solid waste system of gazipur city corporation. It would be very helpful to continue this study if they can provide some information about the existing solid waste management system of Gazipur City Corporation.

During rainy season, problems have been created to dry up the samples collected from different households.

1.5 Outline of Thesis

There has been many study carried out about Solid waste management of different major cities. But no study has been carried out about the solid waste management system of Gazipur City Corporation. As an industry based city it's become the demand of time to carry out this study. These related works that has been carried out is discussed in the chapter of literature review. Different findings from previous works related to sample collection, waste collection system, present scenario of the city has also been discussed in this chapter. The chapter methodology contains study process that are necessary to conduct the study. Sampling, generation rate calculation, present & future estimation and overall methodology is discussed in this chapter. The result, data sheet, graphs are provided in the chapter four. Chapter five contains the analysis of the collected data.

CHAPTER TWO
Literature review

Solid waste are all the waste arising from human and animal activities that are normally solid and are discarded as useless or unwanted. Economic Development, urbanization and improving living standard in cities have led to an increase in the quantity and complexity of generating waste. Rapid growth of population and industrialization degrades the urban environment and places serious stress on natural resources which undermines equitable and sustainable development. Current global MSW generation levels are approximately 1.3 billion tons per year, and are expected to increase to approximately 2.2 billion tons per year by 2025. This represents a significant increase in per capita waste generation rates, from 1.2 to 1.42 kg per person per day in the next fifteen years.

A total of 7690 tons of Municipal solid waste generated daily at the six major cities of Bangladesh namely Dhaka, Chittagong, Khulna, Rajshahi, Barisal and Sylhet as estimated in 2005. Rapid growth of population, Urbanization and Economic development are the most important factors that lead to the generation of solid waste in Bangladesh. The per capita waste generation of municipal solid waste was ranged from 0.325 to 0.485 kg per capita per day while the average rate was 0.387 kg per capita per day as measured in six major cities of Bangladesh.

MSW generation rates are influenced by

- Economic development
- Increase of industrialization
- Urbanization process
- Public habits
- Local climate.

Generally, the higher the economic development and rate of urbanization, the greater the amount of solid waste produced. Income level and urbanization are highly correlated and as disposable incomes and living standards increase, consumption of goods and services correspondingly increases, as does the amount of waste generated. Urban residents produce about twice as much waste as their rural counterparts.

Solid waste is becoming a bigger problem day by day as the amount of solid waste is increasing day by day. All the countries throughout the world is having this kind of problem. So they are trying to get rid of this problem.

In Bangladesh, this problem is more serious as people don't know the effect of unplanned disposal of solid waste. Bangladesh is a densely populated country. So solid waste is becoming more and more serious problem in this country.

Gazipur City Corporation is the largest city corporation in the Bangladesh. It is also a densely populated area of the country as it is an industrial area. Most of the people of this area are from poor economic background and they are mostly illiterate. So they have very poor knowledge about proper solid waste disposal.

Illiterate people don't know much about the solid waste disposal and harmful effects of it. They throw their wastes here and there which creates a big mass in the society. This creates bad smell and harmful germs. Some people throw the waste out of the dustbin. It is also a bad habit. People throw their wastes into the water bodies like ponds, rivers, canals which makes the water contaminated. For this water would become harmful to use.

Previously land filling was a great way to solid waste disposal. But now a day's amount of land is decreasing with the increasing population. So this method is losing its efficiency.

Incineration is also good way to get rid of the solid wastes. But it produces a huge amount of CO_2 gas and other GHG gases which is very harmful to the livings and the environment.

Recycling is also good way to get rid of the solid waste. Here the reusable elements are collected and recycled to use them again. This reduces the amount of waste.

Compost fertilizer can also be produced by the organic materials from the solid waste. After the decomposition of the organic materials they can be used as fertilizer.

Some countries around the world is producing power from the solid wastes. It is the best way to get rid of the solid wastes.
In the developing countries like Bangladesh, the solid waste management has become a great problem to overcome. It is because

- We don't have enough funding or man power to overcome this kind of problem.
- System loss is also responsible for this condition.
- Corruption is the biggest obstruction in Bangladesh.
- Illiteracy is also a major problem to the solid waste management.
- Public awareness is also necessary

CHAPTER THREE
Methodology:

3.1 Introduction

This study examines the waste generation & collection patterns in Gazipur City Corporation and estimates the problems created due to municipal solid waste and helps to find ways to overcome those problems. First the amount of waste generation is to be calculated. Then the amount of waste collection is to be determined. Comparing those data, a future waste generation scenario can be visualize. Then some suggestion can be given to overcome those problems which are created due to waste generation.

3.2 Study area

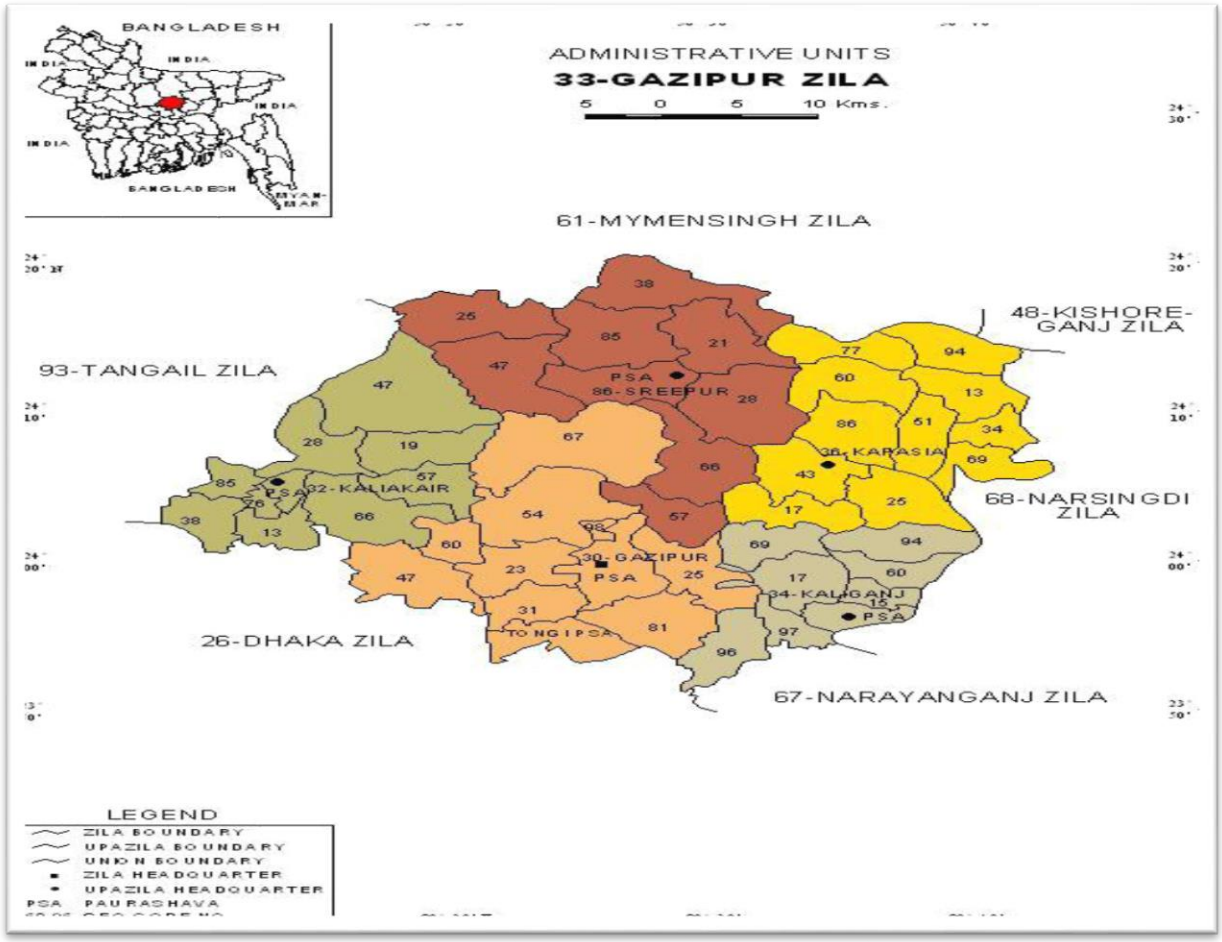
Gazipur was established as zila at 1984. Recently it has been converted into city corporation. It is the largest city corporation of Bangladesh. It is bounded on the north by Mymensingh and Kishoreganj zila, on the east by Narsingdi zila, on the south by Naranyanganj and Dhaka zilas and on the west by the Tangail zila. It lies between 23º53' and 24º21'north latitudes and between 90º09' and 92º39' east longitudes.

The total area of the zila is 1770.54 sq. km of which 17.53 sq. km was riverine and 273.42 sq.km. is a forest area. Total population is 34,03,912. population density is 1884 per sq. km(in 2011).

3.3 Study design

Gazipur City Corporation can be divided into 5 zones. They are –

- Gazipur upazila
- Ksligonj
- Kaliakoir
- Kapasiya
- Sreepur



3.3.1 Description of Study area

Gazipur Upazila:

The upazila occupies an area of 457.67 sq. km. including 0.31 sq. km. river area and 54.52 sq. km. forest area. It is located between 23o53' and 24o11' north latitudes and between 90o20' and 92o30' east longitudes. The upazila is bounded on the north by Sreepur upazila, on the east by Sreepur and Kaliganj uapzilas and Rupganj upazila of Narayanganj zila, on the south by Uttara Thana and Mirpur thanas of Dhaka megacity and on the west by Kaliakair and Savar upazilas.

Kaliakair:

The upazila occupies an area of 314.13 sq. km. including 1.22 sq. km river area and 79.72 sq. km forest area. It is located between 24o00' and 24o15' north latitudes and between 90o09' and 90o22' east longitudes. The upazila is bounded on the north by Sreepur upazila and Shakhipur upazila of Tangail zila, on the east by Gazipur Sadar upazila, on the south by Savar and Dhamrai upazilas and on the west by Mirzapur upazila of Tangail zila.

Kaliganj:

The upazila occupies an area of 214.63 sq. km. including 2.15 sq. km river area and 0.34 sq. km. forest area. It is located between 23o54' and 24o02' north latitudes and between 90o26' and 92o39’ east longitudes. The upazila is bounded on the north by Sreepur and Kapasia upazilas, on the east by Palash and Shibpur upazilas, on the south by Rupganj upazila of Narayanganj zila and on the west by Gazipur Sadar upazila.

Kapasia:

The upazila occupies an area of 356.98 sq. km. including 10.69 sq. km river area and 17.40 sq. km. forest area. It is located between 24o02' and 24o16' north latitudes and between 90o30' and 90o42' east longitudes. The upazila is bounded on the north by Goffargaon upazila of Mymensingh zila and Pakundia upazila of Kishoreganj zila, on the east by Monohardi upazila of Narsingdi zila, on the south by Kaliganj upazila and on the west by Sreepur upazila.

Sreepur:

The upazila occupies an area of 462.94 sq. km. including 3.16 sq. km river area and 121.44 sq. km. forest area. It is located between 24o01’ and 24o21’ north latitudes and between 90o18’ and 90o33’ east longitudes. The upazila is bounded on the north by Bhaulka and Giaffargaon Mymensingh zila on the east by Kapasia upazila, on the south by Kaliganj and Gazipur Sadar upazilas on the west by Kaliakoir uapzila.

The division of study area helps to survey the study area properly and smoothly and helps on focused qualitative approach. This qualitative approach would help to find a proper and effective ways of solid waste disposal and management services which is strongly related with the everyday life of the people.

3.4 Data collection:

To carry out the study, both the primary and secondary data sources were used. Primary data were collected through practical observation and field based data collection of generation, collection, transportation of solid waste. Data is collected through questionnaire survey both open ended and closed ended questions and formal and in formal interviews. Secondary data was collected from published and unpublished sources. Secondary data was collected from GCC (Gazipur city corporation, both Jaydebpur and Tongi City Corporation office), Rajuk (Rajdhani Unnayan Kartipokkha, Dhaka) and BBS (Bangladesh bureau of Statistic, Agargaon, Dhaka).

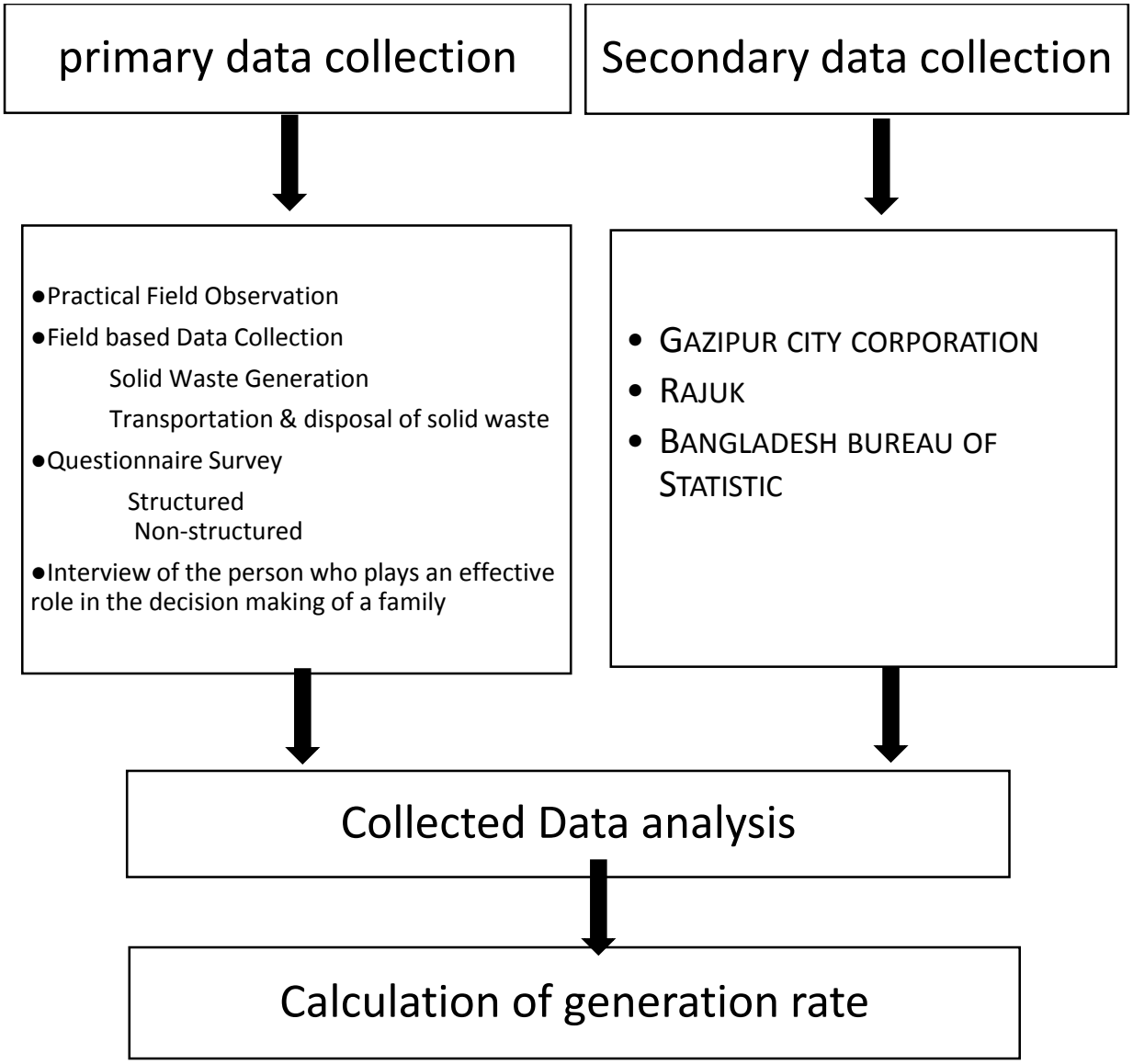


Figure: The overall data collection process in flow chart

3.5 Sampling Procedure

Sampling is one of the most important parts of the study. In this study zone wise sampling was done. Amount of selected questions to collect information was asked to

the respondents. There was also some unselected questions asked to the respondent for information purpose. Respondents were selected from different sectors of the society. Respondent answers were recorded properly.

Solid waste samples were also collected from respondent's house. These samples were dried in the sun to find the moisture content. These dried samples were also used to find the composition of the solid waste. At least 15 families of different classes were taken from each zone. These samples were evaluated manually; it helped to find the generation rate of the solid waste.

CHAPTER FOUR
RESULT AND DATA ANALYSIS

4.1 Introduction

In this chapter, the results of present generation rate, composition of sample waste collected from different zones, future generation rate are included and discussed briefly.

Gazipur City Corporation (GCC) is divided in five zones. The name of the zones are

- Gazipur zone
- Kaligonj zone
- Kaliakoir zone
- Kapasiya zone
- Sreepur zone

We have selected a fixed house from different zones based on size of house, size of family, economic condition and conducted our survey for data collection. From these data we calculate a rate generation based on the sample collected from different house. From this rate we can estimate the daily existing waste generation per day in Gazipur City Corporation. Then we can also calculate the future amount of waste generation for a definite amount of time.

4.2 Zone wise Data Representation:

4.2.1 Survey zone: Gazipur Zone

- Area Range : Tongi - Rajendrapur
- Total No. of respondent family:25
- Total No. of respondent: 95
- Total amount of waste sample collected = 46.477 kg
- Weight of sample after drying= 24.617 kg
- Amount of waste generation = 0.489 kg per capita per day
- Moisture content= 47.03%

Percentage Composition

Component of sample	Percentage composition (%)
Polythene	3.37
Paper	1.78
Plastic	1.85
Plastic bag	0.95
Glass	0.80
Cloth	0.29
Wood	0.41
Organic component	90.5
Dust	0.016
Total	100

Graphical representation of percentage composition

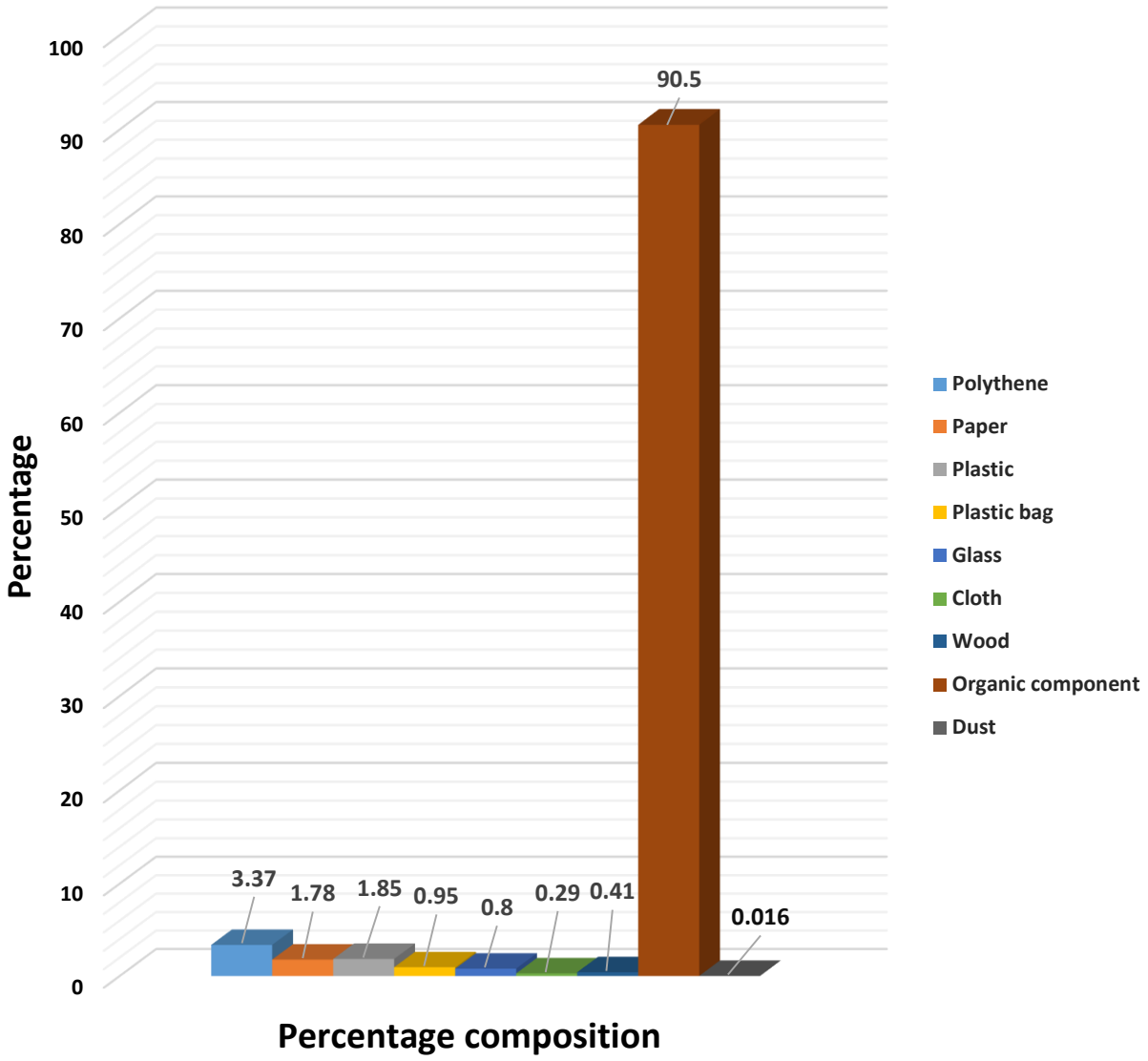


Figure: Percentage composition of collected sample from Gazipur zone

4.2.2 Survey zone: Kaligonj Zone

- Area area : Tongi Station road - Norshingdi district
- Total No. of respondent family:15
- Total No. of respondent: 57
- Total amount of waste sample collected = 18.607 kg
- Weight of sample after drying= 9.251 kg
- Amount of waste generation = 0.327 kg per capita per day
- Moisture content= 50.28%

Percentage Composition

Component of sample	Percentage composition (%)
Polythene	4.48
Paper	1.72
Plastic	1.41
Plastic bag	0.38
Glass	0.19
Cloth	0.08
Wood	0.38
Organic component	90.91
Dust	0.45
Total	100

Graphical representation of percentage composition

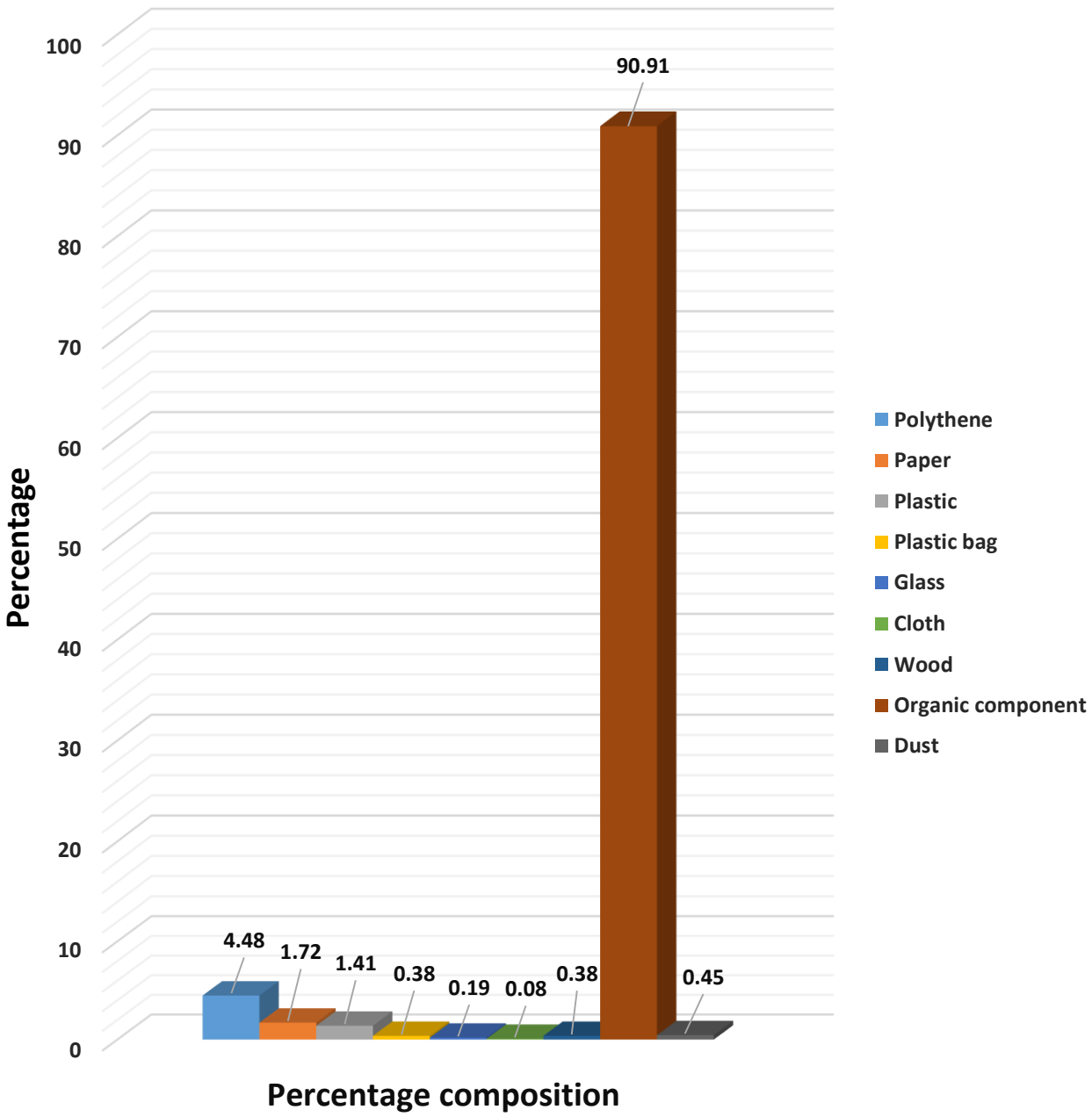


Figure: Percentage composition of collected sample from kaligonj zone

4.2.3 Survey zone: Kaliakoir zone

- Area Range : Gazipur Bypass - Kaliyakoir Upazila
- Total No. of respondent family: 15
- Total No. of respondent: 53
- Total amount of waste sample collected = 24.09kg
- Weight of sample after drying= 12.2415 kg
- Rate of waste generation =0.454 kg per capita per day
- Moisture content= 49.18%

Percentage Composition

Component of sample	Percentage composition (%)
Polythene	5.007
Paper	2.32
Plastic	2.42
Plastic bag	1.38
Glass	0.58
Cloth	0.23
Wood	0.49
Organic component	87.52
Dust	0.04
Total	100

Graphical representation of percentage composition

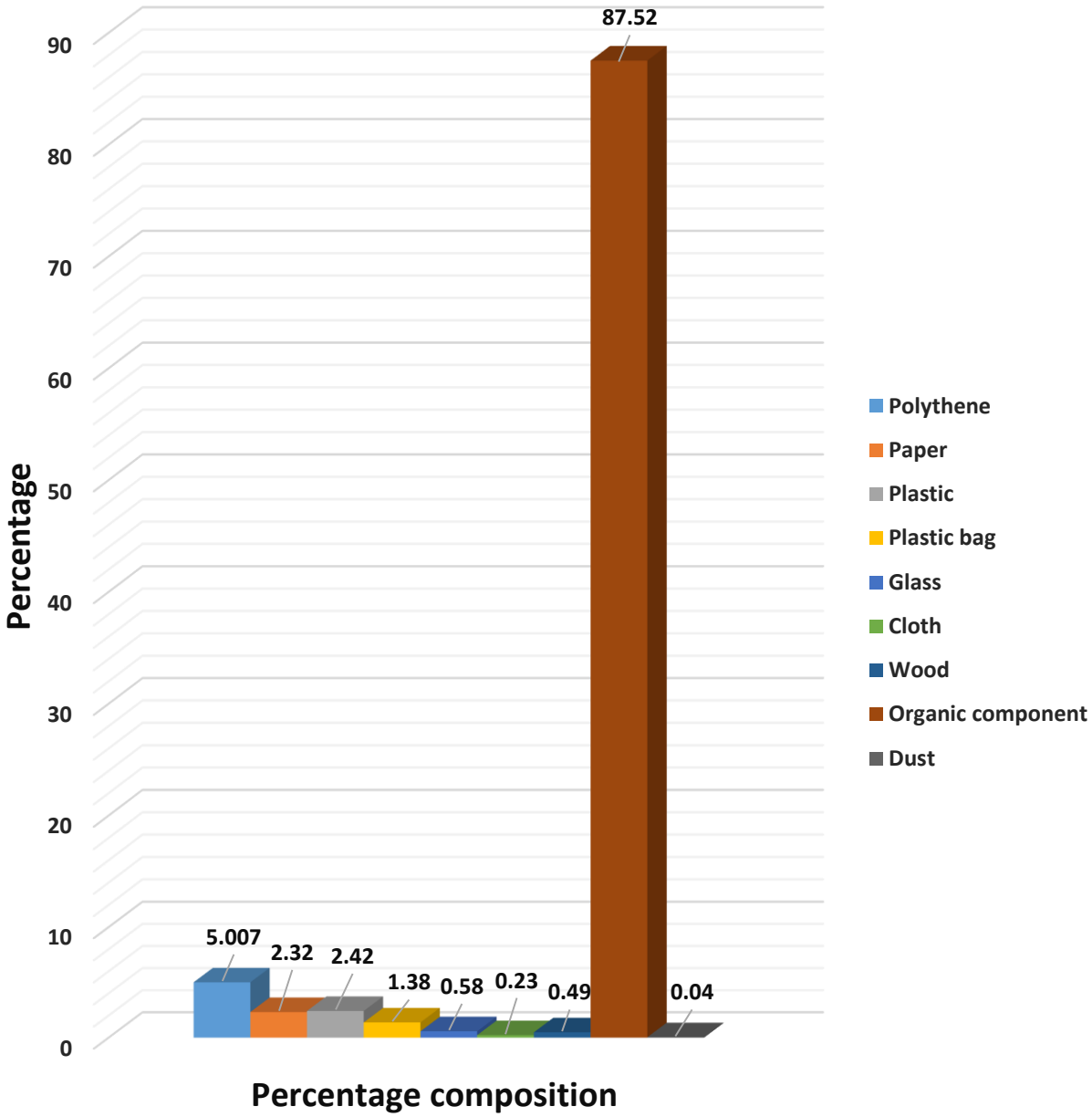


Figure : Percentage composition of collected sample from kaliakoir zone

4.2.4 Survey zone: Kapasiya zone

- Area Range : Rajendrapur-Tok (Kishorgonj)
- Total No. of respondent family : 15
- Total No. of respondent : 62
- Total amount of waste sample collected = 25.24 kg
- Weight of sample after drying= 12.4505 kg
- Amount of waste generation = 0.407 kg per capita per day
- Moisture content= 50.67%

Percentage Composition

Component of sample	Percentage composition (%)
Polythene	3.05
Paper	1.12
Plastic	1.83
Plastic bag	1.02
Glass	0.87
Cloth	0.2
Wood	0.056
Organic component	91.86
Dust	0.03
Total	100

Graphical representation of percentage composition

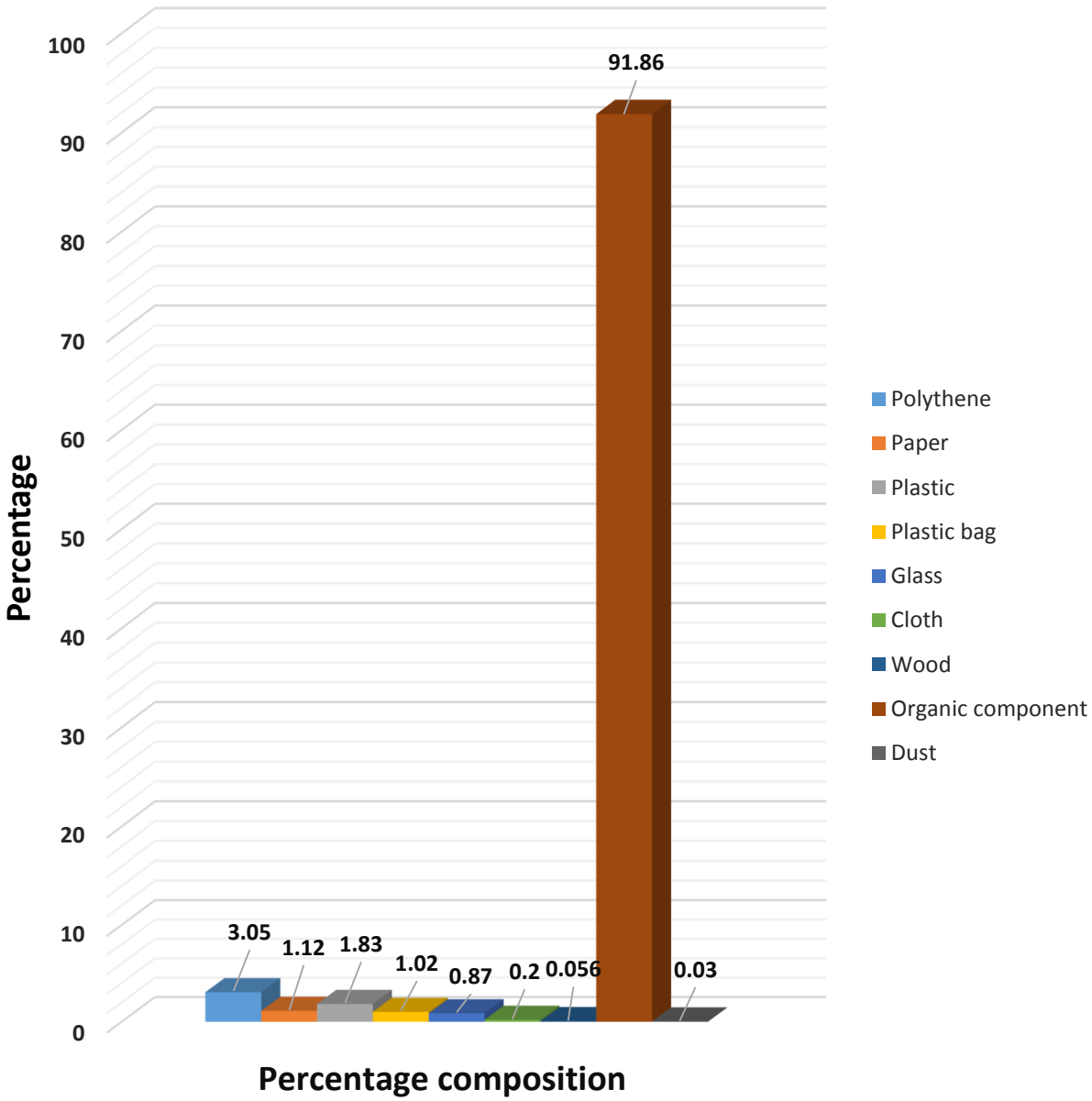


Figure : Percentage composition of collection sample from kapasiya zone

4.2.5 Survey zone: Sreepur zone

- Area Range : Rajendrapur – Telihati (Mawna)
- Total No. of respondent family: 15
- Total No. of respondent: 66
- Total amount of waste sample collected = 31.81 kg
- Weight of sample after drying= 16.005 kg
- Amount of waste generation = 0.482 kg per capita per day
- Moisture content= 49.69%

Percentage Composition

Component of sample	Percentage composition (%)
Polythene	3.37
Paper	1.73
Plastic	2.34
Plastic bag	0.53
Glass	0.29
Cloth	0.11
Wood	0.21
Organic component	91.35
Dust	0.07
Total	100

Graphical representation of percentage composition

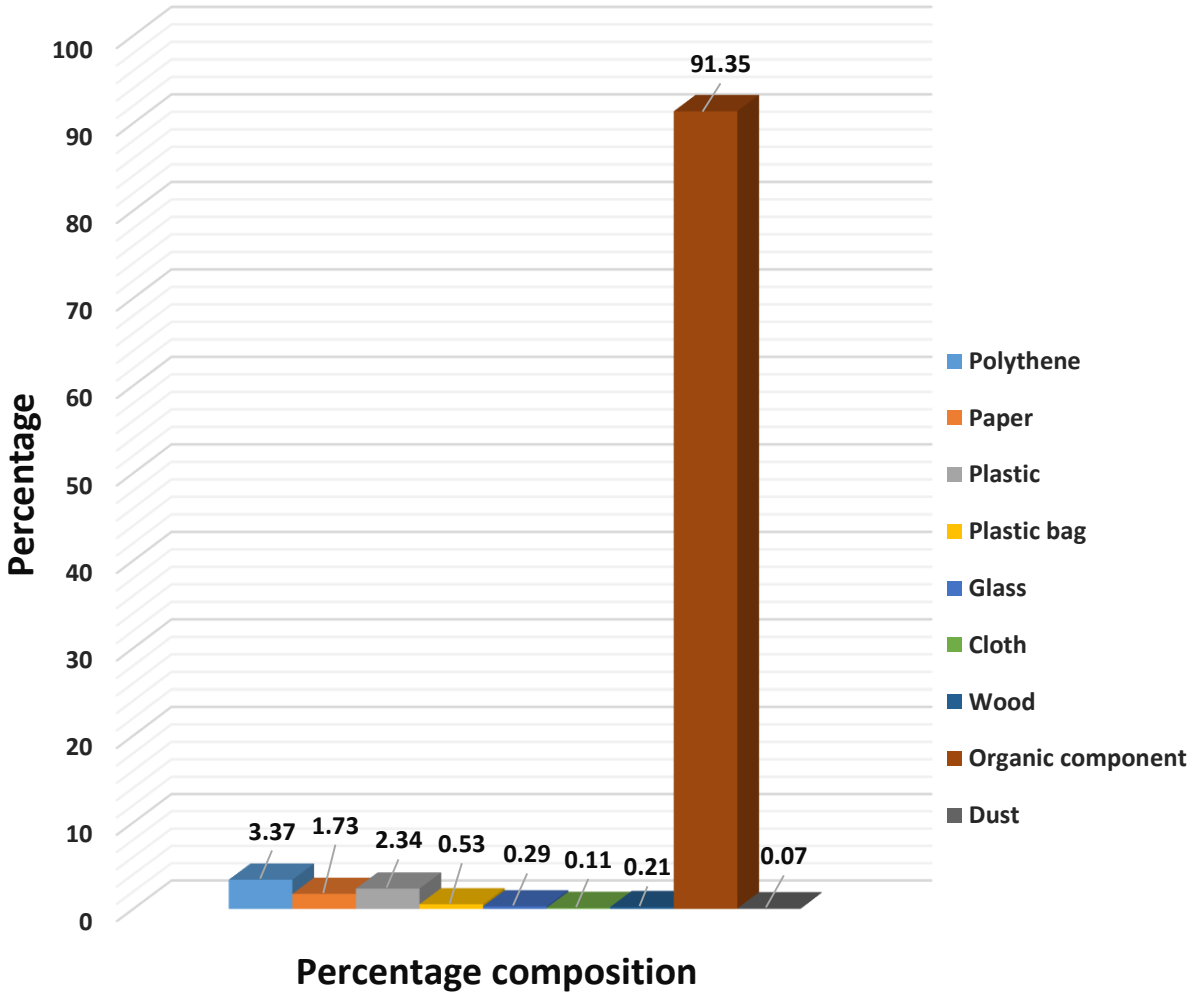


Figure : Percentage composition of collected sample from sreepur zone

4.3 Data Analysis from collected sample

Survey area: Gazipur City Corporation

- Total No. of respondent family: 85
- Total No. of respondent: 333
- Total amount of waste sample collected = 146.224 kg
- Weight of sample after drying= 74.5043
- Amount of waste generation = 0.439 kg per capita per day

  = 1.72kg per household per day

- Moisture content= 49.04%

Percentage Composition

Component of sample	Percentage composition (%)
Polythene	3.72
Paper	1.74
Plastic	1.99
Plastic bag	0.866
Glass	0.59
Cloth	0.204
Wood	0.32
Organic component	90.54
Dust	0.085
Total	100

Graphical representation of percentage composition

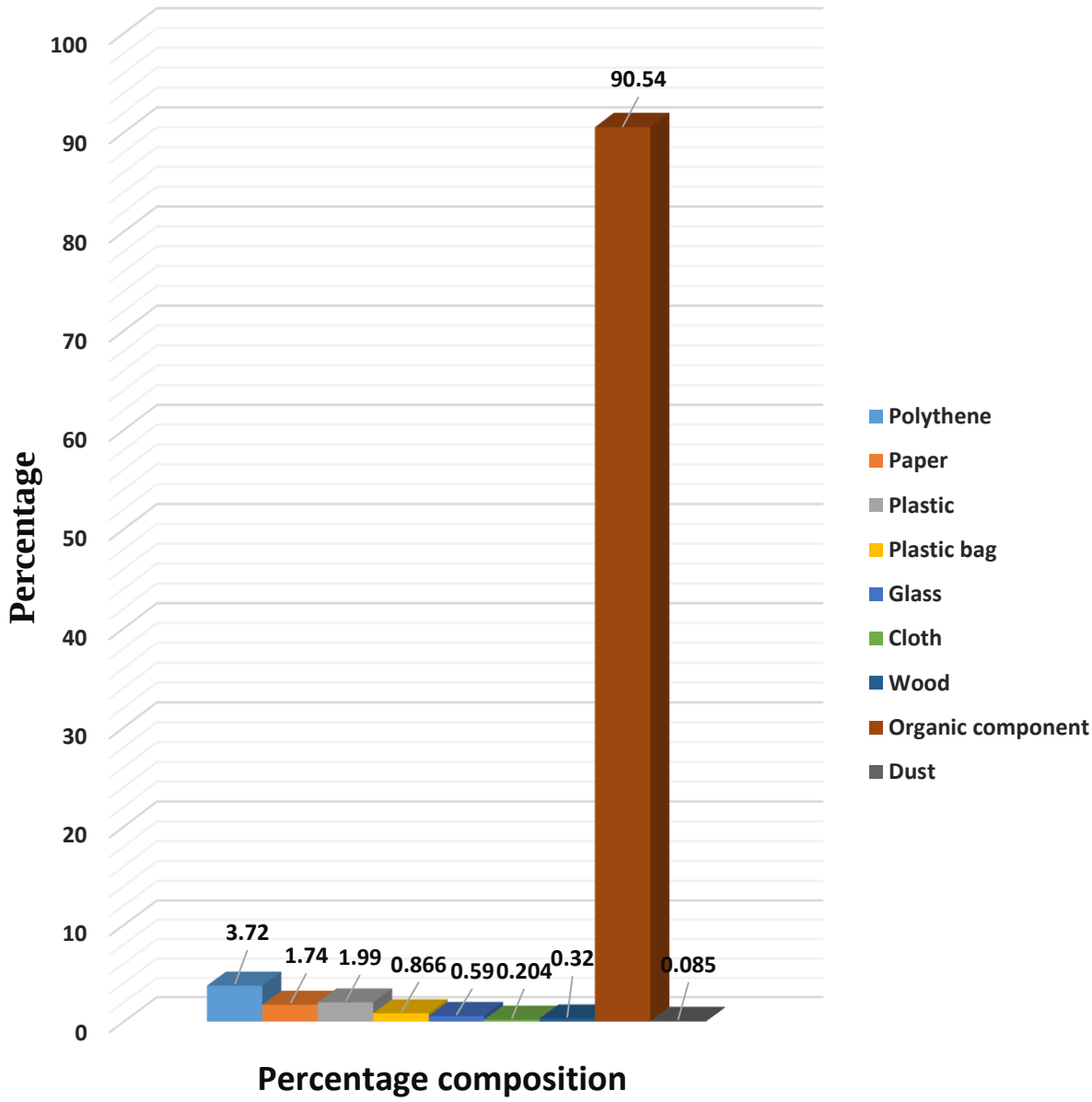


Figure: Percentage composition of collected sample from different zones of Gazipur City Corporation

4.4 Future Estimation:

From the survey data we able to determine the approx. waste generation rate of Gazipur City Corporation. With the help of this generation rate we found the daily production of solid waste in Gazipur City Corporation. With the help of this data we can calculate the future condition of solid waste generation in Gazipur City Corporation for a definite period of time.

By data analysis using the information from the survey sample and population data from BBS, we found that

- Present population of Gazipur City Corporation =3979775(approx.)
- Waste generation rate from our survey=0.439kg per capita per day.
- Amount of waste generation in Gazipur= 1747.121ton per day (approx.)
- In 2035, number of population of Gazipur will be=1,25,21,190(approx.)
- In 2035 approximate amount of waste generation will be=5496.80 ton per day

CHAPTER FIVE

Discussion and Conclusion

5.1 Discussion

Gazipur was established as zila at 1984. Recently it has been converted into city corporation. It is the largest city corporation of Bangladesh. It is bounded on the north by Mymensingh and Kishoreganj zila, on the east by Narsingdi zila, on the south by Naranyanganj and Dhaka zilas and on the west by the Tangail zila. It lies between 23º53' and 24º21'north latitudes and between 90º09' and 92º39' east longitudes.

The total area of the zila is 1770.54 sq. km of which 17.53 sq. km was riverine and 273.42 sq.km. is forest area. Total population is 34,03,912. population density is 1884 per sq. km(in 2011).

At present it is the largest city corporation in Bangladesh. The waste generation in this area is estimated to be around 1747.121 ton per day. Of this quantity only 60% is collected efficiently and the rest is left. Generally the solid waste of Gazipur City contain moderate moisture content. The major part of solid waste is mainly organic component.

In high socio-economic family, daily waste generation rates were generally higher than the other lower socio-economic families.

The Gazipur City Corporation has over the past 3 years initiated with participation of NGOs, vermicompost facilities for treatment of organic wastes. The waste collection and transportation is done by the City Corporation. The transported waste is segregated at the disposal site and compost generated. In the absence of a sanitary landfill facility, the inorganic waste is currently crudely dumped within the site.

Solid waste collection and transportation is available only in Gazipur City Corporation. Other urban areas and rural areas are dumping their solid wastes in the adjacent low lying lands and rivers and canals. Such practices are causing serious environmental problems of river waters.

Waste disposal facilities run by the City Corporation under solid waste management programs cover the central and core areas only. There are well established solid wastes dumping sites in the city corporation area. The main dumping site (area 10.0 acres) of

Gazipur City Corporation is located beside the highway in Bhurulia, which is in the north of the city corporation area. The present dumping site is not sufficient as per information received from the conservancy department. So the department is trying to find additional space to use it as dumping place. The department will buy land for this purpose as soon as it is available. As per information received, about 1747.121 tons of solid waste is generated and collected daily but the quantity transported to the dumping place is only about 60% of the production. This difference is resulted from various reasons. Some of the useful portion of the solid waste is separated by the young street children, who collect it for selling to potential buyers for recycling purpose. The other reason is that the weight of the material also decreases as it dries up with passage of time.

There are also another two solid waste dumping sites. The Meghna dumping site is located about one kilometer away from the municipal area and has an area of 1.5 acre only. In this dumping site, the solid waste is recycled for producing compost. The other dumping site at Shilmon (area 1.0 acre) is located about 6 kilometers away from the center of the Tongi town and is a temporary arrangement only, which does not have any provision for producing compost.

There are 92 dustbins, 50solid waste collection van and 1 medical waste collection van in Gazipur City Corporation.

Since Gazipur City Corporation is a newly formed City Corporation it’s conservancy department isn’t still well organized. They can’t provide proper solid waste management service to every area due to lacking of sufficient man power and equipment.

5.2 Conclusion

A healthy life, cleaner city and a better environment are the logical demand for the city dwellers. In area Gazipur City Corporation is the largest city corporation of Bangladesh. It's also considered as one of the most important industrial zone of our country. Because of rapid population growth and increase of industrialization the amount of waste generation in this area is increasing at an alarming rate.

As the City Corporation is formed newly, corporation authority is struggling to cope with the existing situation. Inadequate management practices and uncontrolled waste dumping are creating numerous environment problems. This study revealed that the existing waste management practices in Gazipur City is behind the satisfactory level due to poor infrastructural facilities in waste management practices, lack of trained workers, lack of technologies and lack of proper planning and monitoring activities.

However as an individual body it becomes difficult for GCC to ensure proper waste management system. They should upgrade the concept of solid waste management and improve the system of entire management. They also need proper implementation of laws and regulations in proper ways.

The following recommendations need to be made for the improvement of the collaborative program-

- Public awareness of health education should be raised through public campaigns.
- Monitoring facilities have to improve.
- Proper implementation of rules and regulations.
- Have to improve collection and transportation equipment.
- Modification of municipal ordinance is needed to accommodate the inclusion of NGO's, CBO's and micro enterprises into the main stream of solid waste management.

- Public awareness of waste segregation, recycling and re use should be raised through public campaigns and media demonstration through NGO's
- The municipality should facilitate innovative, community based programs rather than capital-intensive projects

This study recommends that to implement a well organized and proper waste management system in Gazipur City there needs a conjunctive initiative of government and private sectors whereas community based waste management practices could play a vital role.

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