The Pink City litter survey: Litter investigation of Kardhani Market, Malviya Nagar, Jaipur

Ishfaq Ul Abass
ishfaqulabass@vitj.ac.in
Vivekananda Institute of Technology,
Jaipur, Rajasthan

Sanjay Kumar Meena
sanjaykumarmeena.ce@vitj.ac.in
Vivekananda Institute of Technology,
Jaipur, Rajasthan

Sumit Kumar
sumitkumar.ce@vitj.ac.in
Vivekananda Institute of Technology,
Jaipur, Rajasthan

Satynarayan Chaudhary
satyanarayana.ce@vitj.ac.in
Vivekananda Institute of Technology,
Jaipur, Rajasthan

Shan Ahmad Mir
shanahmadmir.ce@vitj.ac.in
Vivekananda Institute of Technology,
Jaipur, Rajasthan

Raghvendra Sharma
raghvendrasharma.ce@vitj.ac.in
Vivekananda Institute of Technology,
Jaipur, Rajasthan

ABSTRACT

Nowadays, Litter is a worldwide problem. Every country expends a large amount of money to clean up litter. The USA expended almost 11 billion dollars annually. Litter is an environmental problem which not only responsible for air, water, and soil pollution but also produces harmful effects on humans, animals, plants, and the risk of fire hazards, endangering. Litter is big a problem also in India. Annual waste generation is almost 62 million tons in India, only 43 million tons collected by the different Govt. & private bodies. It is clear that almost 19-million-ton waste remains in the form of the litter so our study focused on identifying the nature and source of litter and on solving this problem. We did a survey to identify nature, source, and public attitudes towards litter. We did 2 types of litter surveys in the Satkaar market, Jaipur (Rajasthan). In the first survey, we collected litter material from three streets of the Satkaar market then took it to the lab for analysis. Firstly we categorized litter into seven categories plastic, paper and cardboard, composite material, glass item, metallic items, food and vegetable waste, and other category waste (foam, rubber, cigarette butts, flower and garland, cloths, bird feather). we found that most littering items ids plastic (almost 40% of total % weight of litter), average recyclable litter is 34.66 % and biodegradable litter is about 43%.in the second survey I made a set of 23 questions to know the attitude and behavior of public towards litter. We found in this survey that most people think that litter is a crime, both administration, and the public are responsible for litter when the educational level increased then the habit of littering is reduced.

Keywords— Biodegradable, Kardhani Market, Litter, Paper, Plastics, Rubber, Street, Recyclable, Trash.

1. INTRODUCTION

According to Geller (1980) litter is any piece of misplaced solid waste. Trash that folks don't put during an ashcan is named Litter which causing littering. Basically, litter is the waste in the wrong place. Litter is also responsible for kill wildlife and increase disease. Litter is small pieces such as cigarette butts, candy wrappers, plastic bottles, plastic bags, aluminum cans, paper cups, fast food wrappers, cardboard boxes, packaging material, etc. Due to the rapid growth of population, urbanization, industrialization leads to an increased production rate of litter. The litter produced long-term harmful effects on the environment because it takes a very long time to dispose of. Litter takes a very long time to disappear from the environment for example aluminum cans take about 50 – 60 years to disappear, tin cans take 50 years, plastic bags (sad but true) 20 – 1000 years, cigarette butts take 2 – 10 years, banana peels take 2 years, plastic bottles (very sad) 450 – 1000 years. Finally, we can say that litter is a serious environmental problem. Litter is a common noun that consists of waste product that has been throwing out in unsuitable locations.

This word also can use as a verb "to litter "which meaning is to drop or leave something at an unsuitable location. Litter is a common problem of modern times. Littering is a piece of waste at misplacing. Basically, litter is an essential problem and to solve the problems an important work. So we have to do great work to solve this problem. The history of litter is very old, the human is doing such type of exercises from ancient time. We have to do a great study to solve this problem and to identify the nature of litter. We have to know the behavior of the people towards the litter. Large and hazardous items of rubbish such as tiers, electronics, batteries, and large industrial containers are sometimes dumped in isolated locations, like national forests and other public lands. It is a

person's impact on the environment and remains a significant environmental problem in many countries. Litter can exist within the environment for long periods of your time before decomposition and be transported over large distances into the world's oceans. Litter can affect the quality of life. Cigarette butts are the foremost littered item within the world, with 4.5 trillion discarded annually. Litter can be hazardous to health. Debris falling from vehicles is an increasing cause.

Fig. 1: The Litter Material

1.1 Impact of the Litter:
The negative impact of litter can be evaluated are as follows:–
1) Hazardous materials like tires, rubber, polythene, and other items that are illegally dumped rubbish can leach into water sources. Thus, soil and water sources are polluted by litter.
2) When tires are burned they can smolder for a long period of time, emitting hundreds of harmful chemical compounds that pollute the air causing respiratory illness. Additionally, the residue left behind can harm the, and leach into underground water.
3) Ocean containers such as paper cups, cardboard, food packets, plastic drink bottles, and aluminum drinks cans get filled up with rainwater providing breeding locations for mosquitoes.
4) In addition, a spark or lightning flash can start a fire if it strikes litter material such as paper bags and cardboard boxes.
5) Litter can be hazardous to health. Debris falling from vehicles is an increasing cause of automobile accidents discarded dangerous goods, chemicals, tires sharps waste and pathogens resulting from the litter can cause accidental harm to humans.
6) Litter also carries a substantial costs to the economy. Cleaning up litter in the US costs hundreds of dollars per ton, about ten times more than the cost of trash disposal, with a cost totaling about $11 billion per year.
7) Animals may get trapped or poisoned with litter in their habitats. Cigarette butts and filters are a threat to wildlife and have been found in the stomachs of fish, birds, and whales, who have mistaken them for food. Also, animals can get trapped in the rubbish and be in serious discomfort. For example, the plastic used to hold beverage cans together can get wrapped around animal's necks and cause them to suffocate as they grow. Other instances where animals could be harmed by litter include broken glass lacerating the paws of dogs, cats, and other small mammals.

1.2 Branded Litter
A number of credible studies have shown that fast food packaging is one of the most common forms of litter while McDonald's is the most common brand of litter, despite having messages to dispose of properly, such as the Ronald McDonald "tidy man" marking. According to Keep Britain Tidy in 2013, Cad buries chocolate wrappers, Walkers crisp packets and Coca-Cola cans were the three top brands that were the most common pieces of rubbish found in UK streets.

1.3 Anti-Litter Campaigns
Many group exist in the world with the aim of rising awareness and run campaign including clean-up the country.
➢ World cleanup day
➢ Keep America beautiful
➢ Clean up Australia
➢ Keep Britain tidy etc.

1.4 Life Cycle of Litter
Litter can remain visible for a long period of time before it eventually bio-degradable with some items of condensed glass, plastic items possibly remain in the environment for over a million years. About 18 percentage of a litter usually traveling through stream water system end up in the local stream, rivers, and other waterways. Uncollected litter can flow into streams and local water bays and estuaries. Litter that is collected can be recycled. However, some types of litter cannot be recycled, it is almost 40 percent. So the litter has a very long life cycle. Litter is the most common problem that is enabled for causing different types of disease. We are repeatedly doing such type mistakes so the amount of litter increasing day by day. The smallest litter material wants at least one month so that it will be diffuse completely. The litter may be reuse if it is reusable for all time. We should try to use reusable material for domestic's purposes. We should also try to solve environmental problems more and more efficient way. We also should stop the use of polythene.
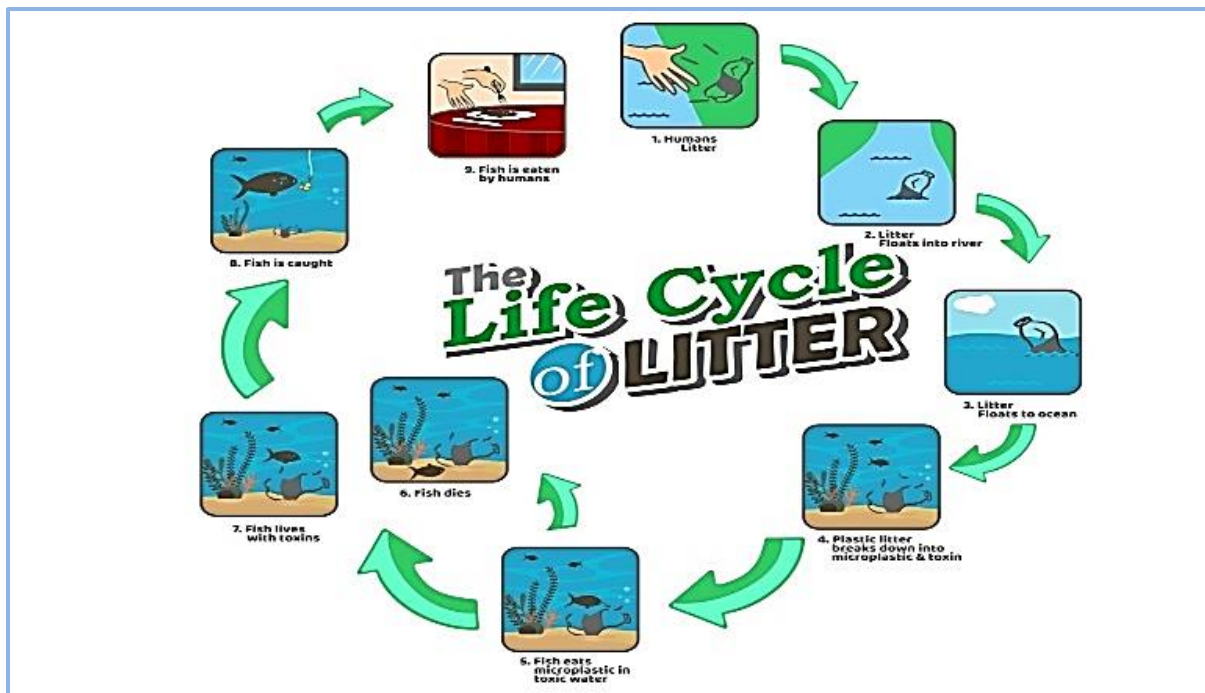
Fig. 2 : Life Cycle of Litter

2. LITERATURE REVIEW

Fatin Shawana et al., 2012; Litter represents one of the major contributors to environmental pollution and degradation. This problem is rooted in human behavior. There are numerous strategies that have been put forward by researchers for litter reduction. Nevertheless, the focus of actual behavioral intervention in reducing litter has received relatively research attention. Based on 50 studies being reviewed, it was found the five major approaches can be an influence to a person littering behavior (environmental design, prompts, clean up the prior litter or beautification, environmental education, and environmental participation.

MAG, July 2006; Maricopa Association of Governments (MAG) launched litter prevention and education program known as Don't Trash Arizona. The purpose of the program is to reduce litter on the regional freeway system by developing a strategy to increase public awareness and change behavior (MAG, July 2006). The secondary research found that litterers were predominately single males, aged 18 to 24—with a secondary tier of litterers aged 25 to 34. They tend to be smokers, eat/buy fast food two times per week or more, frequent bars and nightclubs, and drive pickup trucks. According to the Transportation Research Board, 55 percent of littering is deliberate, while 45 percent occurs "accidentally" when items blow or fall off vehicles. Littering most often takes place when drivers are alone, and many reported that they did not consider small items like cigarettes and candy wrappers to be litter.

Adeline 2005; conducted an interview in Singapore to examine the reasons why people littering in Singapore. One of the respondents said the reason for littering is because the area is already heavily littered and a piece of litter will not give any big effect on that area that was already dirty. The influence of the dirty area will encourage more litter. Thus, by cleaning up the area it will discourage people from littering. Cleaning up the area will reduce the likelihood of the person's behavior to littering in the area. In fact, this finding is not new but it has been recorded as research findings over the past 40 years. This is a reasonable fact because the nature of human beings saw and use the signals from the environment to determine accepted behavior and normal thing to do. The heavily littered area will encourage littering because it sending a message that no one is concerned, the area is not owned by anyone, and lack of personal responsibility to ensure the area to clean. The areas that have high levels of crime is like a broken window which was likely to attract other crimes in the area. It was the condition applied for the littered area (the theory of "Broken Window").

Cialdini, 2003; the behavior of the person was influenced by the descriptive norm (the people perception of what is commonly done accompanied by the expectation that people will behave according to the pattern e.g., everyone littered here, so doesn't matter for another one litter). The injunctive norm (refers to people's perception of what is commonly accepted within particular culture e.g. littering is wrong). Thus, a person's behavior was influenced by the descriptive norm in the trash already there.

Kallgren et al, 2000; Studies on 'Youth Littering behavior is conducted by Groomer Associates in Los Angeles (2009) It was found that to encourage less littering behavior among young people is to reduce the amount of litter in the area. This can be done by performing continuous cleaning up to ensure effectiveness. By engaging the community to participate in the activities of cleaning, it was also acting as a medium to motivate individuals not to littering and create awareness of environmental concern by the continuous cleaning activity (Roa).

Heberlein, 1971; stated that the messy environment will encourage littering. The study examined students who were handed a small piece of paper with an advertising message as they walked out of the classroom. There have two different conditions along the hallway which they passed either 'pre litter' with scrap paper or a clean area. This study found the students who accepted the handout, 16 percent of the students were littered in a messy and dirty environment compared to only 3.6 percent of students littered in a clean area. (Finnie, 1973) provided support and stated that more people will litter in the messy environments rather than a clean environments regardless of the presence of litter receptacles.
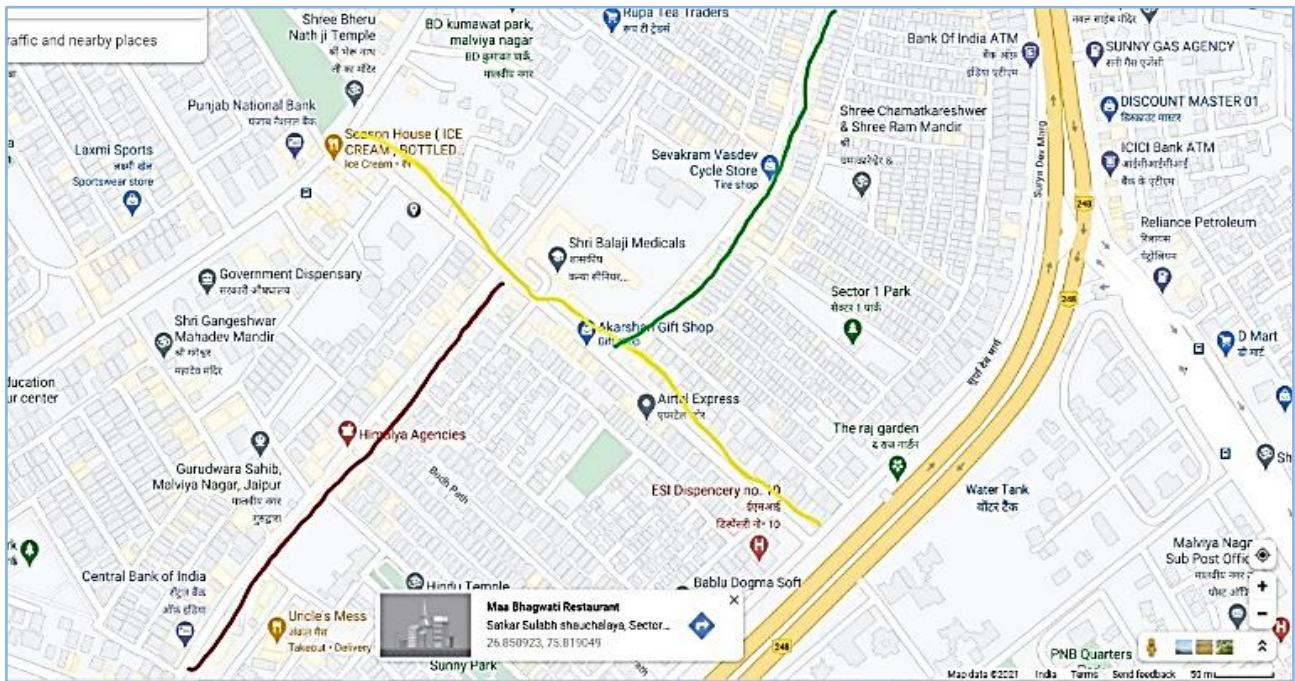
3. METHODOLOGY

Fig. 3: Map of Survey Area

The methodology we used can be evaluate in these points:

A. **Selection of Site:** First, we selected three streets of Kardhani market Malviya Nagar Jaipur. These streets are shown in fig. 3.

B. **Collecting of litter:** We collected the litter by hand and then taken it to the laboratory for purpose of analysis. Now we air-dried the sample. We repeat the procedure for seven weeks. We did all the sampling in three innings morning, afternoon and night. Before collecting the litter, we had prepared the list of cleaning times in the market.

C. **Categorization of litter items:** After the calculation of every type of item, we categorize all the items into 8 broad categories. This is based on their parent material. The category is given below:

- Plastics
- Paper items
- Composite items
- Food and vegetable wastage
- Metal items
- Disposal cups
- Glass
- Others
    The others have cloths, bird feathers, flowers and garlands, cigarette butts, tree dropping.

D. **Calculation of percentage weight of every category item:**
Finally, we calculated the weight percentage of every category item by the help of this formula
W= weight of special type item
$W_{t.}$ = Total weight of all type item
Percentage of a special type of item= $(W/W_{t.})$ *100
Finally, on the basics of it we can find out different results.

4. RESULT AND DISCUSSIONS

4.1 The litter Count:
The litter count is given by the total number of items per site. It is defined as the number of items per street. Total number item that collected is as given in table 1 as follows:-

Table 4.1: Litter Count

Name of Street	Calculation (Morning +Afternoon +Late night)	Total No. Of Item per Street	Total No. of Items
Street-1	574+630+548	1752	
Street-2	584+640+535	1759	5262
Street-3	590+645+522	1757	

Graph 4.1 can be used to compare the data in a future surveys, Horizontal line showing the name of the street and the vertical line is showing the number of Items.
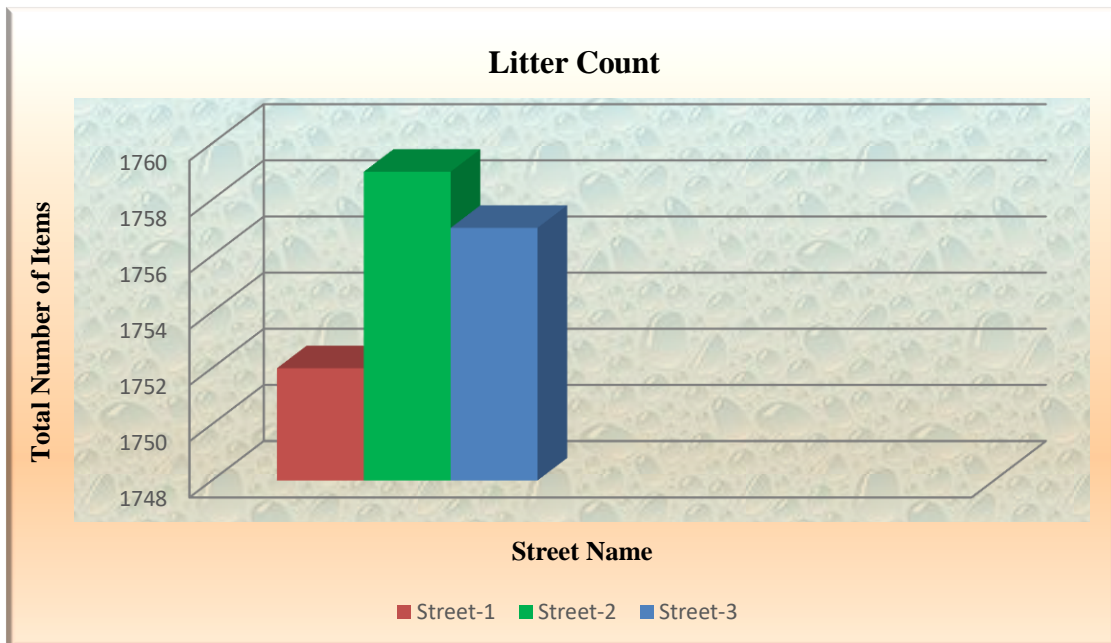
Litter Count

Graph 4.1: Litter Count

4.2 Average Litter Count Items Per Streets:

It is defined as average item count in each street.

Average litter count items per streets = total amount of items /number of sampling

- ***For Street 1***: 1754/3 = **584.66**
- ***For Street 2:*** 1759/3 = **586.33**
- ***For Street 3:*** 1757/3 = **585.66**

4.3 Broad Categorization of Litter:

We see the data of all the table we can easily see the most littered item is plastics almost 40% the 8 most littered items can be seen in the given pie chart 4.2.

- ➢ Plastics items = 40%
- ➢ Paper item 24%
- ➢ Composite items =16%
- ➢ Food and vegetable items =10%
- ➢ Metal items =7%
- ➢ Disposal and cups =5%
- ➢ Glass items 3%
- ➢ Others items =5%

The others contain item like cloths, bird feather, flower and garland, cigarette butts etc.

Percantage by Distribution of Collected Data
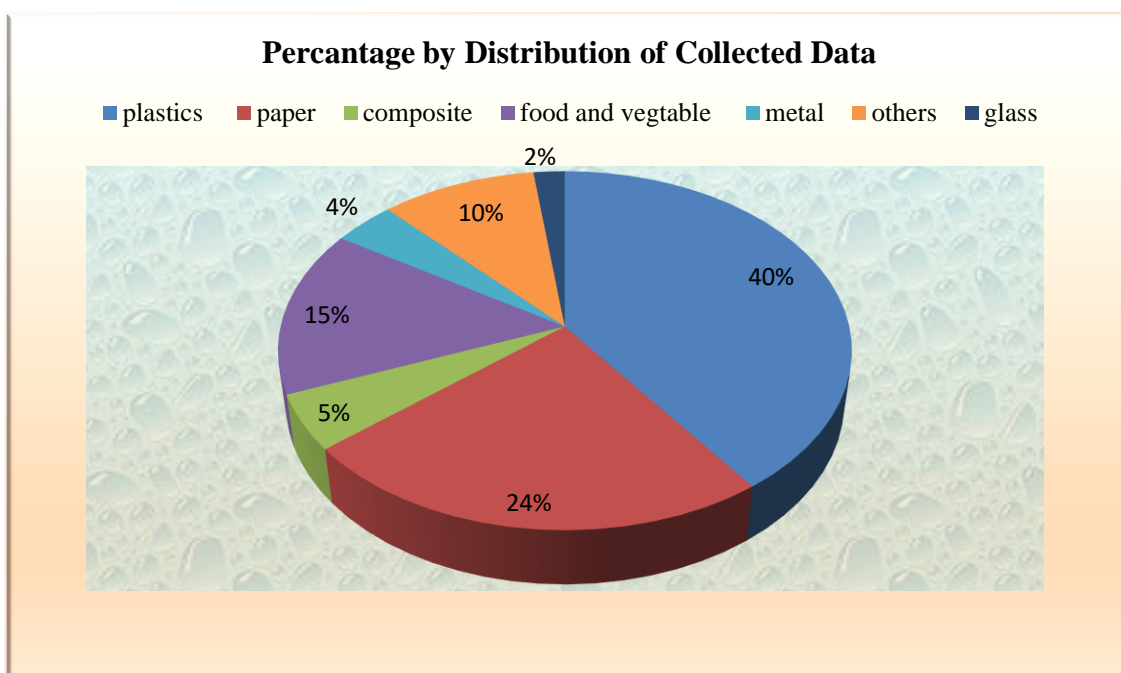
Graph 4.2: Percentage of All Category Items

4. Recyclables Litter material in All Three Streets:

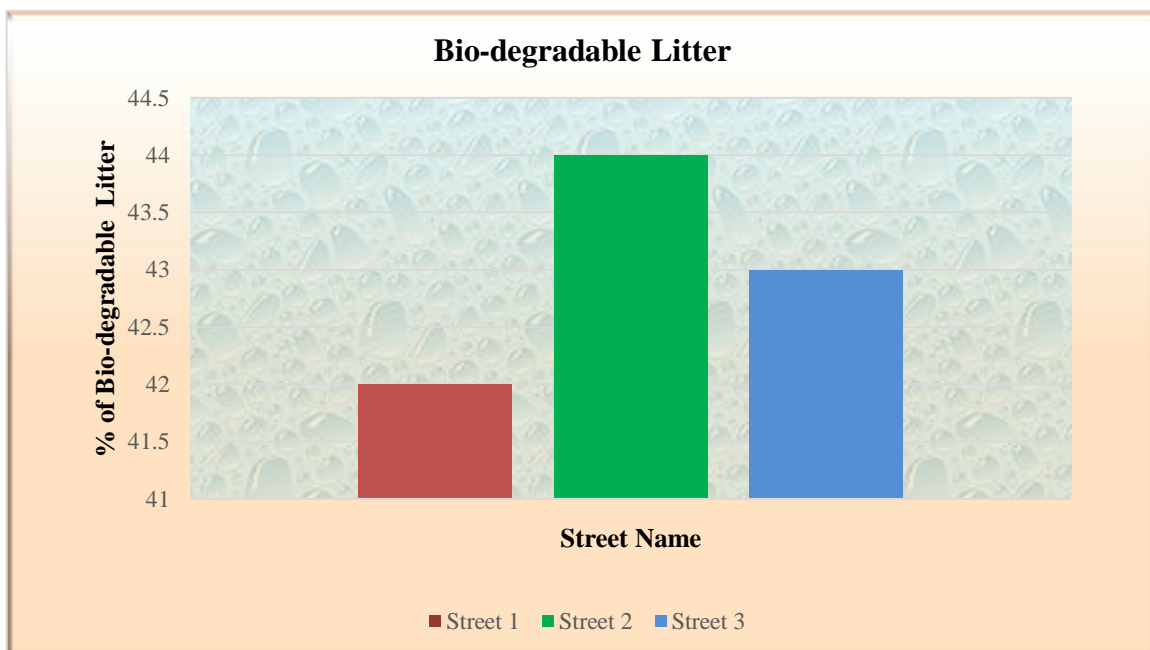### Percentage Distribution of Recyclable Litter Per Street
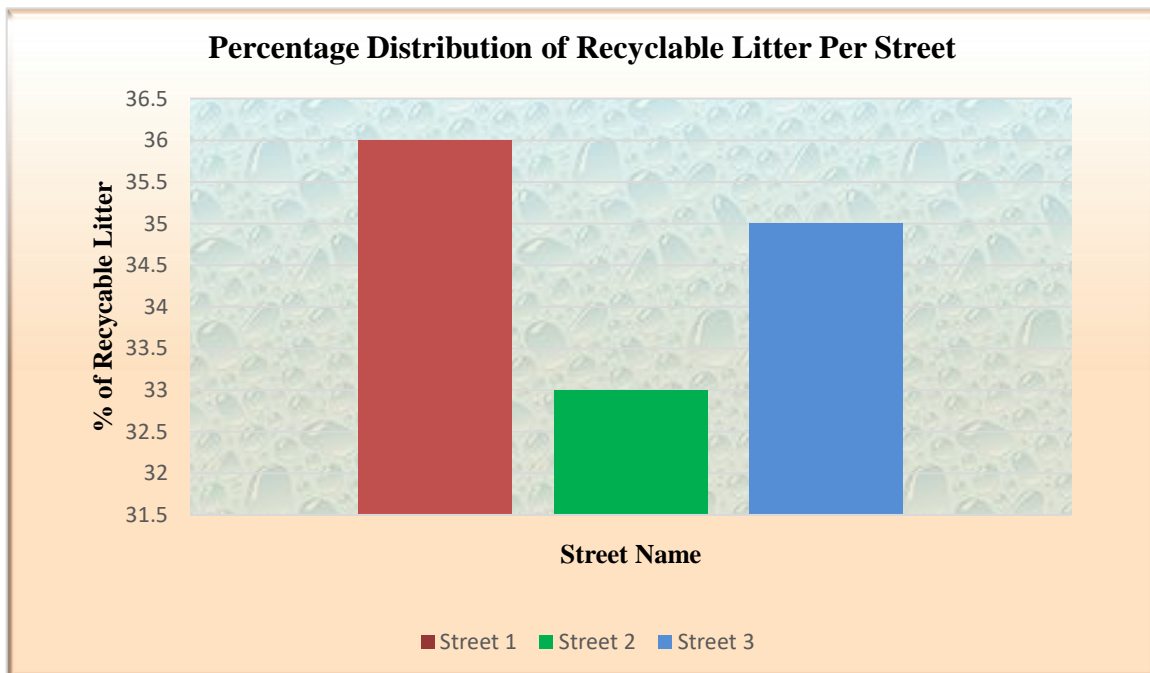
Graph 4.3: Percentage of Recyclable Litter Content

This graph is showing data recyclable data in each street the data is as following:

Street first=36%, Street second =33% and Street third have =35%

4.5 Biodegradable Litter Content in All Three Streets:

Bio-degradable Litter

Graph 4.4: Percentage of Biodegradable Litter Content

5. CONCLUSIONS

On the basis of the observations and results, the following conclusions, are given below.
  ➢ The total number of litter items collected by us is 5262. Tree dropping is the topmost litter item on the basis of a number of counts.
  ➢ The average litter count founded for streets 1, street 2, and street 3 is 585, 587, and 586 respectively.
  ➢ The topmost litter material is plastic almost 40% by the basis of % weight and bird feather is founded as a least litter material almost 0.3% by the basis of % weight.
  ➢ The plastic bottles have maximum contribution in plastic category litter.
  ➢ The total recyclable litter founded for streets 1, street 2, and street 3 is 24%, 27%, and 30% respectively.
  ➢ The total biodegradable litter for streets 1, street 2, and street 3 is almost 31%, 33%, and 35% respectively.

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