CHAPTER 3

MATERIALS AND METHODS

3.1 RESEARCH OVERVIEW

This chapter describes the methodology that was used to determine the quantity of plastic waste generation, as well as, plastic recycling in Petaling Jaya, Malaysia. The research includes primary and secondary data collection, sampling and distribution of questionnaires. In the absence of segregated waste information, the composition of the wastes was unknown. The per capita and total waste generation capacity at source point was also not known. Therefore, a primary data collection through field survey; physical collection, segregation and wet weight measurement of the wastes and interviews with set questionnaires was initiated as per the outline of study objective; Side by side, the secondary data were collected from the relevant organizations such as Petaling Jaya City Council (MBPJ), Malaysian Plastics Manufactures Association (MPMA) and etc.

3.2 RESEARCH PROCESS

Some steps are designed in order to carry out the research which is provided below:

a) Field observation

b) Field survey and physical measurement of waste samples

c) Data collection at the source points

d) Questionnaire/ survey

e) Analysis of the data

The framework of process was provided in Figure 3.1.

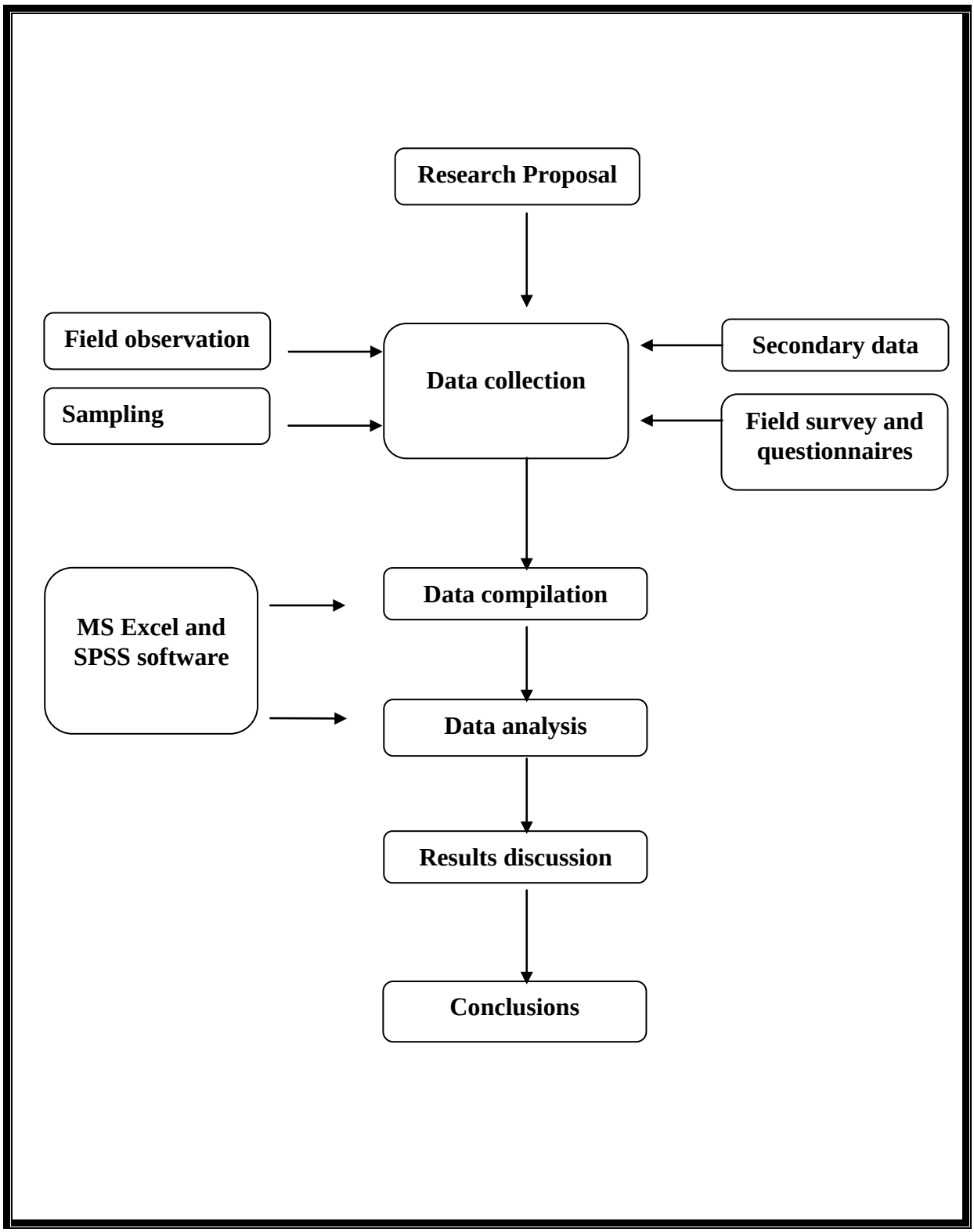

Figure 3.1: Process Flowcharts for the Research Approach

3.3 RESEARCH BASIS

In this study, information on population size and population distribution in Petaling Jaya (PJ) was collected to determine sample population for the study. The important parameters are considered in the survey were respondents' opinion on plastic recycling and quantity of plastic in waste stream.

The application of plastic recycling has direct relation to the rate of waste generated. It depends on different factors such as income and education level of citizens, lifestyle, type of residences, etc. These characteristics call for different approach in waste recycling. Segregation and measurement of waste is crucial when designing a recycling plan. In this study, PJ was selected based on the capacity of the residential area to generate high percentage of plastic waste (Yatim, and Arshad, 2010). The hospitals, commercial and industrial areas are not covered in this study since the focus is on household waste generation. Environmental, economic and social conditions will aid in identifying areas' potential for plastic recycling. Geographical location and distribution of population in Petaling Jaya was considered for sampling from residents' areas to determine the waste generated.

3.3.1 Field Observation (Visual Imaging)

Direct observation was essential during the survey. Photographs from the study areas and other places were taken to have visual observations of the sites and activities. Relevant photographs are included in the chapters where appropriate.

3.3.2 Study Area

Petaling Jaya (PJ) is located west of Kuala Lumpur (Appendix H). In 2006, PJ was granted city status. Since then, PJ has been commonly known as the most developed non-capital city in Malaysia. This place comprises mostly residential, commercial and some industrial areas. It is located in the Petaling district of Selangor with an area of approximately 97.2 km². The population in 2011 was 631,150. PJ is under the administration of the Petaling Jaya City Council or Majlis Bandaraya Petaling Jaya (MBPJ). PJ progressed rapidly due to the massive rural-urban migration. PJ also acts as one of the center hubs of Klang Valley (comprising of Petaling Jaya, Kuala Lumpur, Shah Alam, Subang Jaya and surrounding areas).

PJ is divided into several sections. These sections are subdivided into smaller neighborhoods. Some sections have their own names (SS1 as Kampung Tunku), while other sections are grouped together (SS6, SS5 as part of Kelana Jaya). The city sections are numbered as such that the older sections have no prefixes to their section number (Section1, Section 9) while later sections have prefixes such as PJU (Northern Petaling Jaya), PJS (Southern Petaling Jaya), and SS (sub-section) (Figure 3.2).

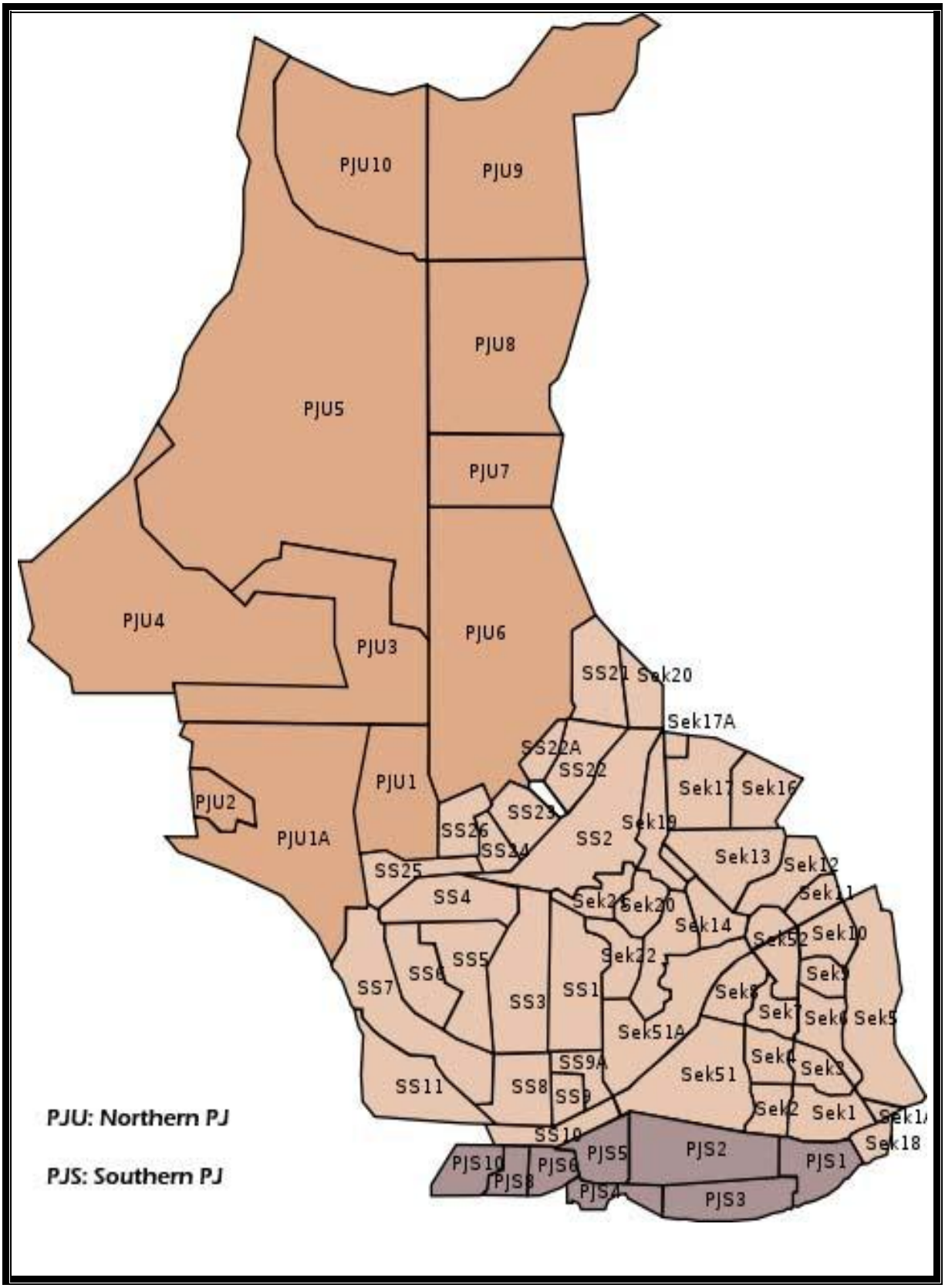

Figure 3.2: Petaling Jaya Sections

3.3.3 Sampling

The sample size was determined using the sample size formulation by Yamane, (1983) to justify the selection of samples necessary to give significant results (Appendix I). The data was obtained from MBPJ in 2011. Since the population of PJ was 631,150, it was reasonable to have 400 samples. According to Yamane (1983), the sample yields a 95 percent confidence level or a standard error of 5 percent gives a probability of less than 5 percent or $p< 0.05$. Therefore, in the results of the study, if the probability is a 0.05 or lower, the relationships can be said as significant (Aron and Aron, 1997). A sample size of 400 representatives (Table 3.1 and Appendix J) were selected based on cluster sampling from residential area of each four main parts of Petaling Jaya; by considering the sample size formulation of Yamane, (1983) and the population, 89 samples from sections, 124 samples from SS, 97 samples from PJS and 90 samples from PJU where selected, which refer to the distribution of population. According to data from MBPJ, collection of waste from these residential areas is carried out once in two days. It is basically characterized by house to house collection. In this study, wastes at the source points were collected from selected houses within PJ residential area for one week to determine daily waste quantity and the composition.

Table 3.1: Respective Sample Representation

	Source description	**Source Population**	**Sample Size (number of household)**
1	Section 1-52	140637	89
2	SS 1-26	196116	124
3	PJS 1-10	152311	97
4	PJU 1-10	142086	90
Total		**631150**	**400**

Sampling process:

Sampling from residential communities in each section of PJ was done according to the following processes:

1. Each selected house was identified with codes where sampling bags which have been labeled accordingly were provided to the households (Plate 3.1).

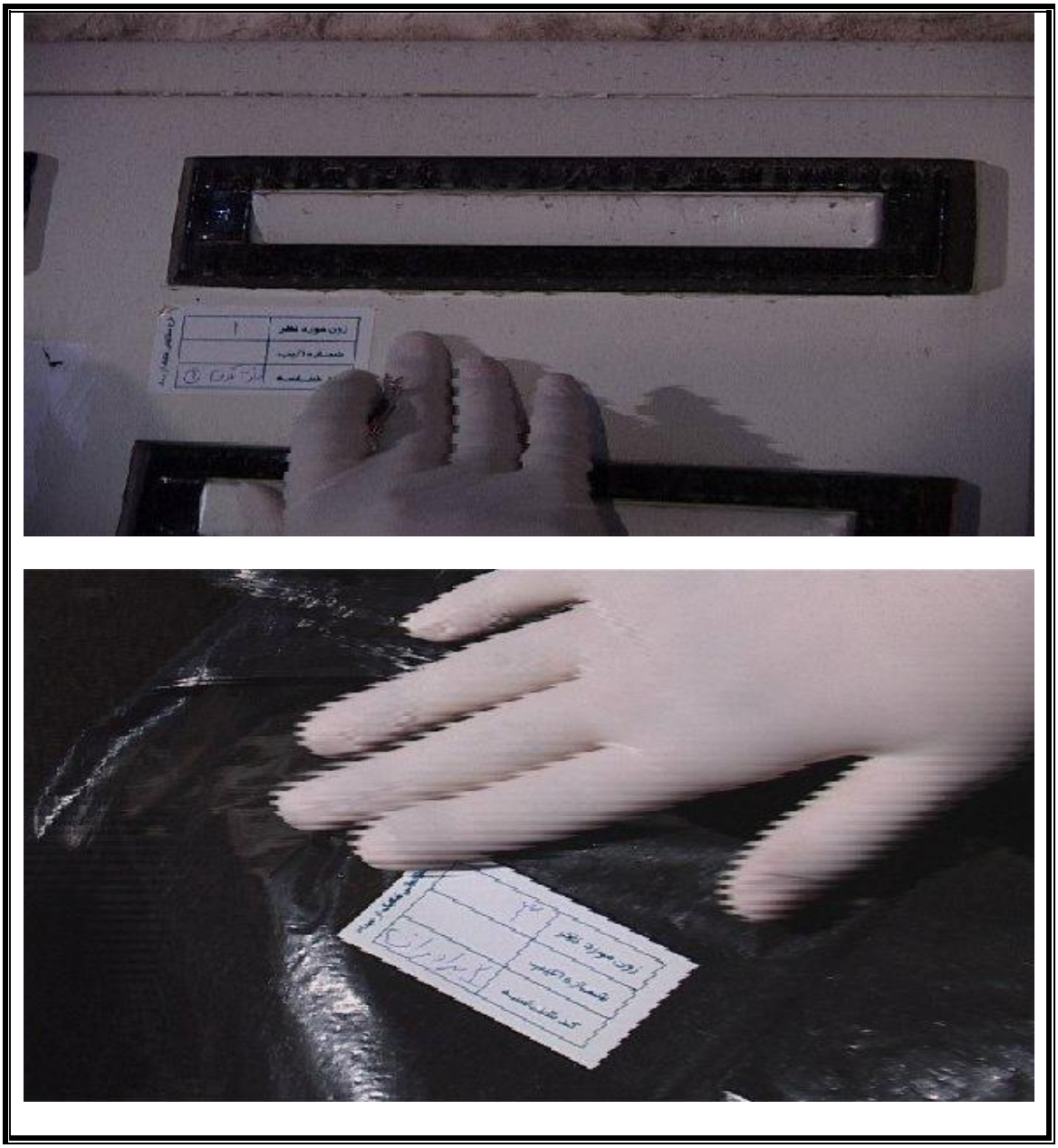

Plate 3.1: Labeling for Identifying Samples from Houses

2. The wastes were separated into two categories namely wet and dry waste by the household. Waste was collected immediately once it was placed outside the house for disposal. The time of collection was agreed earlier with the cooperation of the residents (Plate 3.2).

Plate 3.2: Label on the Sampling Bags

3. This study analyses the amount of waste generated at source by taking into considerations the actual composition. Wastes from each household are taken to a designated place and separated according to different types, namely paper, plastic, cardboards, textiles, and food organic wastes. They are weighed separately with details given more on plastic waste (Plate 3.3).

Plate 3.3: Segregation and Weight Measurement of the Wastes

3.3.4 Survey Instruments: Questionnaire

Having outlined the objectives and scope of the study, a list of questionnaires was developed accordingly (Appendix K) in both languages, i.e. Bahasa Malaysia and English to ease the process of understanding. The questionnaires consisted of 55 open-ended questions. The types of topics covered included the demographics of the respondents, as well as, public opinions on recycling, environmental issues, existing management problems, plastic recycling programs, actual recycling activities, and the weights and compositions of household wastes. The survey was conducted personally from house to house. These questions are analyzed statistically. Thus, the questionnaire covers:

- Demographic and social background of respondents in PJ such as gender, age, ethnic group, education level, occupation, income, family size and type of dwelling;
- Attitude towards awareness of environment issue such as recycling, reuse and reduction of plastic;
- Household waste management including quantity of waste, waste separation, storage facility and collection, type of waste, and knowledge and attitude of household wastes.

The attitude dimensions towards recycling are taken directly from questionnaires. The sampling and questionnaires were conducted concurrently to gain a more accurate response and a higher response rate.

3.3.5 Instrument Validity and Reliability

Since the current study is a qualitative research, it was necessary to assess the validity and reliability of the questionnaire. In qualitative research trustworthiness and understand are the main important factors. Trustworthiness is related to credibility, transferability, dependability and conformality. Understanding is related to descriptive validity, interpretive validity, theoretical validity and evaluative validity. There some strategies in order to facilitate the process of assessing trustworthiness and understanding of findings. The researcher tried to attend in research site in order to give the best perception about study. And identify pervasive qualities and atypical characteristics. The other criteria which was important in the current study was providing data and information from different sources such as (MBPJ, MPMA article, film, etc). All detailed descriptive data was provided to compare the findings of current

study with other studies which were done in different context. During the process of data collection, data analysis and interpretation external auditor with relevant background examined the whole processes.

3.3.6 Data Analysis

Analysis of data for waste compensation was manually carried out and graphical and statistical representations were based on Microsoft Excel. The Statistical Package for Social Sciences (SPSS) software was used to analyze the results of questionnaires.