

DEVELOPMENT OF SOLID WASTE MANAGEMENT
PLAN IN KUALA NERUS, TERENGGANU

NURADIBAH HAZIRAH BINTI MOHD ZAKI

B.ENG.(HONS.)CIVIL ENGINEERING

UNIVERSITI MALAYSIA PAHANG

UNIVERSITI MALAYSIA PAHANG

DECLARATION OF THESIS AND COPYRIGHT

Author's full name : NURADIBAH HAZIRAH BINTI MOHD ZAKI

Date of birth : 17 JUN 1991

Title : DEVELOPMENT OF SOLID WASTE MANAGEMENT
PLAN IN KUALA NERUS, TERENGGANU

Academic Session : 2015/2016

I declare that this thesis is classified as:

CONFIDENTIAL (Contains confidential information under the Official Secret Act 1972)*

RESTRICTED (Contains restricted information as specified by the organization where research was done)*

OPEN ACCESS I agree that my thesis to be published as online open access (Full text)

I acknowledge that Universiti Malaysia Pahang reserve the right as follows:

1. The Thesis is the Property of University Malaysia Pahang
2. The Library of University Malaysia Pahang has the right to make copies for the purpose of research only.
3. The Library has the right to make copies of the thesis for academic exchange.

Certified By:

(Student's Signature)

910617-11-5610

Date: 13 JANUARY 2016

(Signature of Supervisor)

DR. MIR SUJAUL ISLAM

Date: 13 JANUARY 2016

DEVELOPMENT OF SOLID WASTE MANAGEMENT PLAN IN KUALA NERUS,
TERENGGANU

NURADIBAH HAZIRAH BINTI MOHD ZAKI

Report Submitted in partial of the requirement
for the award of the degree of
B.ENG.(HONS.)CIVIL ENGINEERING

Faculty of Civil Engineering & Earth Resources
UNIVERSITI MALAYSIA PAHANG

JANUARY 2016

SUPERVISOR'S DECLARATION

I hereby declared that I have checked this project and in my opinion, this project is adequate in terms of scope and quality for the award of Bachelor of Civil Engineering (Hons)

Signature :

Supervisor : DR. MIR SUJAUL ISLAM

Position : LECTURER

Date : 13rd JANUARY 2016

STUDENT'S DECLARATION

I hereby declare that the work in this thesis entitled "Development of Solid Waste Management Plan in Kuala Nerus, Terengganu" is my own except for quotations and summaries which has been duly acknowledged. The thesis has not been accepted for any degree and not concurrently submitted for award of other degree.

Signature :

Name : NURADIBAH HAZIRAH BINTI MOHD ZAKI

ID Number : AA10112

Date : 13th JANUARY 2016

ACKNOWLEDGEMENT

Bismillahirrahmanirrahim,

First and foremost, thanks to God Almighty for the guidance and aid in giving me the strength to finish my project “Development of Solid Waste Management Plan in Kuala Nerus, Terengganu” to complete this report. A great appreciation thanks to my project supervisor, Dr. Mir Sujaul Islam for his guidance, advices and knowledge throughout this study. He had taken a lot of effort to give opinions and comment about my project.

Besides, I would like to take this opportunity to express my utmost gratitude to all lecturers and technicians in the Faculty of Civil Engineering & Earth Resources who lending me a hand throughout this project development and not forgotten, Puan Norazimah Binti Abdul Aziz for her advices and support in completing this project.

I also would like to express my sincere appreciation to all my friends who involve in the project development and shared their knowledge and opinions especially to Noorazila Bt Asman and Siti Rohani Bt Mohamad. They do not hesitate to share their opinion or idea to me in completing this project.

Finally, my sincere thankful also extends to my family for their kindness, support and encouragement from the beginning and until the end of my study. I also like to thanks to everyone who involve in producing this project report and their contribution would never be forgotten.

ABSTRACT

Solid Waste disposal and wrong management is both an urban and rural problem. Every person is a potential generator of waste and thus a contributor to this problem. The generation of waste is one thing and the amount of waste generation is another thing. The management and disposal of waste depends on the type of waste generation and it is quite a different issue. Before this, Kuala Nerus was in the district of Kuala Terengganu but after the rapid growth of population and the highest urbanization in that area, Kuala Nerus is declared as a new district in Terengganu. This means that Kuala Nerus will have its own management centre and does not need to rely on management of Kuala Terengganu anymore. This study was carried out in Kuala Nerus Town which is the new district in the state of Terengganu, Malaysia. The main objective of this study was to estimate the type and amount of solid waste generation in Kuala Nerus, Terengganu. The other objective was to make recommendation or suggestion for future action to establish environmentally sound management of solid waste. This study used a combination of both quantitative and qualitative methodologies to research. So, I chose to use document review, observation and interview as the data collection method. The findings revealed that there are a few types of solid waste generated among the community in that area. There are four types of solid waste generated in this area which are paper, plastics, glass and metal. The result obtain shows that the amount of paper generated is 12kg/day while the amount of plastics generated is 10kg/day. Beside that, the amount of metal generated is 13kg/day while the amount of glass generated is 15kg/day. It is also identified that the amount of solid waste generated among the community increases from year to year. From the research, it show that most of the community practice "pit-burning" and also illegal dumping as their method of solid waste disposal. It is observed that people dumped waste along the paths, by the roadsides, in incomplete building structure, in bushes and in bare plots of land without any structures. This study revealed that the majority proportion of public in Kuala Nerus exhibited concern on amount of solid waste generation but sorting of solid waste is less adopted. Therefore, because of the increasing amount of solid waste generated and the low level of public participation in solid waste management in Kuala Nerus, some recommendations have been suggested. The best way to start dealing with the problem is for the Town Council authorities to show the people that they are worth by involving them in the initial planning process.

ABSTRAK

Pelupusan sisa pepejal dan pengurusan yang salah adalah masalah bandar dan luar bandar. Setiap orang adalah penjana potensi sisa dan dengan itu menjadi penyumbang kepada masalah ini. Penghasilan sisa adalah satu perkara dan jumlah penjanaan sisa adalah perkara lain. Pengurusan dan pelupusan sisa bergantung kepada jenis penjanaan sisa dan ianya merupakan isu yang agak berlainan. Sebelum ini, Kuala Nerus berada di dalam daerah Kuala Terengganu tetapi selepas pertumbuhan pesat, pertambahan populasi penduduk dan pemandaran yang paling tinggi di kawasan itu, Kuala Nerus diisytiharkan sebagai daerah baru di Terengganu. Ini bermakna Kuala Nerus akan mempunyai pusat pengurusan sendiri dan tidak perlu bergantung kepada pengurusan Kuala Terengganu lagi. Kajian ini telah dijalankan di kawasan daerah Kuala Nerus yang merupakan daerah baru di negeri Terengganu, Malaysia. Objektif utama kajian ini adalah untuk menganggar jenis dan jumlah penjanaan sisa pepejal di Kuala Nerus, Terengganu. Objektif lain adalah untuk member idea atau cadangan untuk tindakan masa depan untuk menubuhkan satu pengurusan alam sekitar sisa pepejal. Kuala Nerus merupakan daerah baru di Terengganu. Kajian ini menggunakan gabungan kedua-dua kaedah kuantitatif dan kualitatif untuk penyelidikan. Dapatan kajian menunjukkan bahawa terdapat beberapa jenis sisa pepejal yang dihasilkan di kalangan masyarakat di kawasan itu. Terdapat empat jenis sisa yang dihasilkan di kawasan ini iaitu kertas, plastic, kaca dan besi. Hasil kajian mendapati jumlah sisa kertas yang dihasilkan ialah 12kg/hari, manakala jumlah sisa plastic yang dihasilkan ialah 12kg/hari. Ia juga mengenal pasti bahawa jumlah sisa pepejal yang dihasilkan di kalangan masyarakat bertambah dari tahun ke tahun. Dapatan kajian mendapati majoriti masyarakat mengamalkan pembakaran terbuka dan lambakan haram sebagai cara penjanaan sisa mereka. Ia juga mendapati, masyarakat membuang sisa di sepanjang jalan, di tepi jalan, di kawasan bangunan yang belum siap didirikan, di dalam semak dan di kawan lapang. Kajian ini mendedahkan bahawa sebahagian majoriti awam di Kuala Nerus mempamerkan kebimbangan dan sensitiviti mengenai sisa pepejal tetapi cara pengurusan sisa pepejal adalah kurang diterima pakai. Oleh itu, kerana tahap peningkatan jumlah sisa pepejal yang dihasilkan dan tahap penyertaan awam yang rendah dalam pengurusan sisa pepejal di Kuala Nerus, beberapa cadangan telah dikenalpasti. Cara terbaik untuk mula berurusan dengan masalah ini adalah pihak berkuasa iaitu Majlis Perbandaran Kuala Nerus harus menunjukkan kepada rakyat bahawa adalah penting pengurusan bahan pepejal ini dengan cara melibatkan mereka dalam proses perancangan awal.

TABLE OF CONTENT

TITLE	PAGE	
SUPERVISOR'S DECLARATION	ii	
STUDENT'S DECLARATION	iii	
ACKNOWLEDGEMENT	iv	
ABSTACT	v	
ABSTRAK	vi	
TABLE OF CONTENTS	vii	
LIST OF TABLES	x	
LIST OF FIGURES	xi	
LIST OF ABBREVIATIONS	xii	
CHAPTER 1	INTRODUCTION	
1.1	Introduction	1
1.2	Problem Statement	3
1.3	Objectives	3
1.4	Scope of Study	4
1.5	Significance of Study	4

CHAPTER 2 LITERATURE REVIEW

2.1	Introduction, key concept and terminologies	5
2.1.1	Waste	5
2.1.2	Solid Waste Management	6
2.1.3	Public Participation	7

CHAPTER 3 RESEARCH METHODOLOGY

3.1	Combination of Both Quantitative and Qualitative Approaches	10
3.2	Research Design	11
3.3	Data Collection Method	12
3.3.1	Document review	12
3.3.2	Observation	13
3.3.3	Interview	13
3.4	Sampling	14
3.5	Data Processing And Analysis	15

CHAPTER 4 RESULT

4.0	Demographic Characteristics Of Types And Amount Of Solid Waste Generation	17
4.1	Demographic characteristics Of Respondents	20
4.1.1	Respondents to Structure Review	20

4.2	Ways of Public Participation in Solid Waste Management	23
4.2.1	Primary Waste management	23
4.2.2	Waste Disposal Practices	27
4.3	How Else The Public Can Participate in Solid Waste Management	33
4.3.1	Possibility for Waste Reduction	33

CHAPTER 5 DISCUSSION

5.0	The Amount of Solid Waste collected	35
5.1	The Level of Public Participation in Solid Waste Management	36
5.1.1	The Prevalent Participation	36

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

6.0	Conclusion	40
6.1	Recommendations	42

REFERENCES	44
-------------------	-----------

APPENDICES

A	List of Publication and News on New District of Kuala Nerus	46
B	Sample of Solid Waste Collected By MBKT	47
C	Photograph Taken During The research	48
D	Sample of Questionnaire Used in The Research	49

LIST OF TABLES

Table No	Title	Page
4. 1	The total amount of solid waste generation in a day at 10 stations	18
4. 2	Number of respondent by its types in the study area	20
4. 3	Number of respondents by its gender in the study area	21
4.4	Educational level in the study area	21
4.5	Number of members in a house	22
4.6	Use of waste container in the study area	23
4.7	Waste sorting by the respondents in the study area	25
4.8	Significance of educational level in use of waste container use and waste sorting	26
4.9	Responses to whether it is possible to reduce on amount of waste Generated	34
5.1	Generation of solid waste in Malaysia By State (1996-2009)	37
5.2	The material composition in solid waste from various studies and sites (2001-2010)	38

LIST OF FIGURES

Figure No	Title	Page
1.1	Study area of the research	2
3.1	Sampling stations in the study area	9
3.2	Methodology flow chart of the research	16
4.1	Type and amount of the solid waste in a station	17
4.2	Respondents level of education in the study area	22
4.3	Number of members in a house	23
4.4	Own waste container in house	24
4.5	Solid waste thrown on the land by the community	27
4.6	Reused basket as waste container	28
4.7	Responses on who takes the waste from the respondents' premises, for disposal (in %)	29
4.8	Respondent's knowledge on where the waste is disposed of	30
4.9	Illegal dumping waste at nearby bush by resident	32
4.10	What the public does to waste outside their premises	33

LIST OF ABBREVIATIONS

KNTC	Kuala Nerus Town Council
3R	Reduce, Reuse and Recycle
UNEP	United Nations Environment Program
MW	Municipal waste
SW	Solid Waste
SWM	Solid Waste Management
OED	Oxford English Dictionary
QT, QL	Quantitative and Qualitative
WDP	Waste Disposal Practices
MBKT	Majlis Bandaraya Kuala Terengganu
UMT	Universiti Malaysia Terengganu
UNISZA	Universiti Sultan Zainal Abidin
IPG	Institut Perguruan
MRSM	Maktab Rendah Sains Mara
UMP	Universiti Malaysia Pahang

CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Malaysia is faced with daunting challenges related to solid waste management. Due to an increase in population, economic growth, inadequate enforcement of waste legislation, infrastructure, and public attitude among others, solid waste management is considered a crucial issue in Malaysia, particularly in urban settings (Dawda Badgie, Mohd Armi Abu Samah, Latifah Abd Manaf, Azizi B. Muda, 2012). Solid waste disposal and wrong management is both an urban and rural problem. Every person is a potential generator of waste and thus a contributor to this problem. To generate waste is one thing, the type of waste generated is another and yet also the way the generated waste is managed or disposed of is quite a different issue. It has more often than not turned out that the rate at which solid waste is generated is far higher than the capacity to responsibly manage this waste. Waste is generated by and from different sectors which are domestic, commercial, industry and others and in many instances, the waste management responsibility has been left to the government or administrative authorities. There is growing consensus that the immediate stakeholders in the issue of solid waste (the generators of waste), in this case the residents need to join hands with the authorities in dealing with this problem that has far-reaching environmental and human health effects.

Kuala Nerus is one of the district in Terengganu that rank high in urbanization and urban population nowadays. As Kuala Nerus's urban areas increase in number and expand in geographical and population size, solid waste is swiftly emerging as a significant issue in environmental management.

Particularly, waste volumes have increased in urban area due to the growing urban population, concentration of industries, consumption of residents, and inadequate finance and facilities to manage waste and disposal. This district of affairs has led to the volume of solid waste generated to go beyond what the available facilities can accommodate.

One of the major factors that have contributed to poor waste collection and management in Kuala Nerus is limited community participation in solid waste management. The limited participation has budded from co-ordination and collaboration problems that exist among the three stakeholders in solid waste management are the communities, the public (government) and the private sectors (World Bank. 2012). This study seeks to explore public participation in solid waste management in Kuala Nerus. The current level of participation as well as whether and what, can be done to improve public participation in solid waste management are concerns addressed by this study.

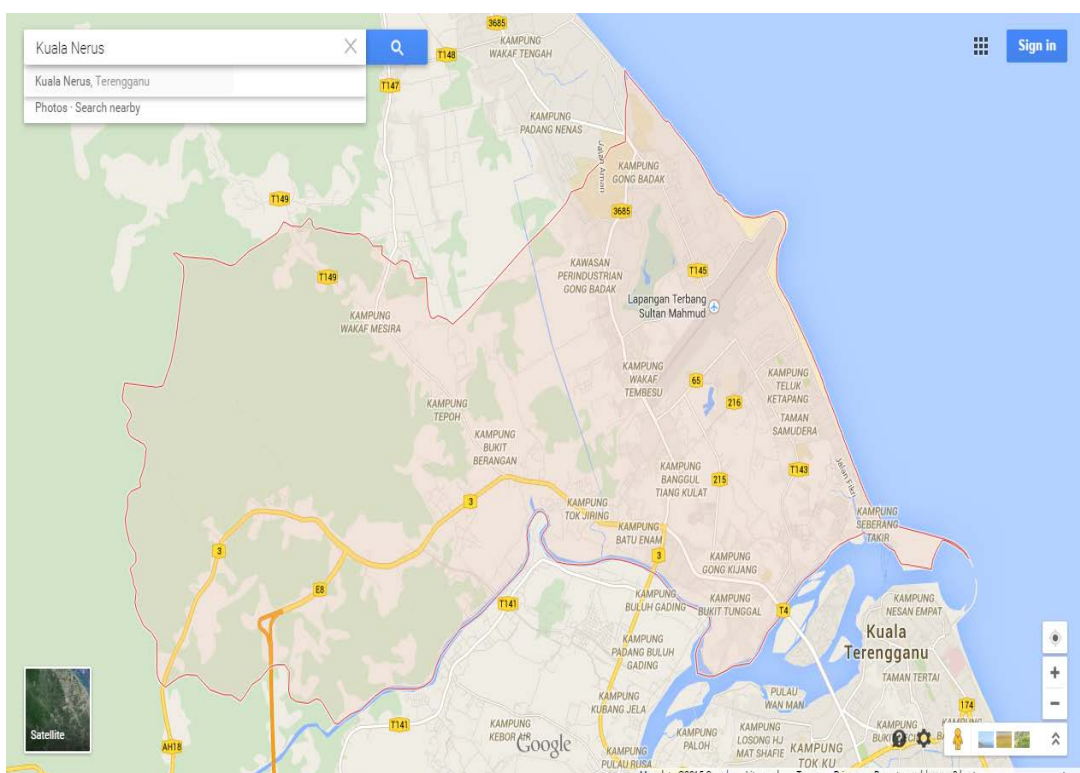


Figure 1.1 : Study area of the research

1.2 PROBLEM STATEMENT

Solid waste management may be not the major issue in the residential nowadays. But with the new development of town and country, it probably will increase time to time and it is also effect directly into environmental issues. Moving from straight disposal to waste management can reduce the risk of environmental issues.

Reduce, reuse and recycle (3R) solid waste may save money, improve the relationship between the public in the residential, also improve the relationship of the authority with the public instead of keep the beautiful environment from any pollution like air pollution, water pollution, odor pollution and so on (Hester, R.E. & Harrison, R.E. 2002). Beside that, it also can improve the awareness about the importance of solid waste management among the public. The challenges of involving the public in solid management plan in Kuala Nerus Town Council (KNTC) also will be considered during this research in order to improve the public participation in solid waste management in Kuala Nerus Town Council (Seow Ta Wee, Indera Syahrul Mat Radzuan & Jamaluddin Md Jahi. 2008).

1.2 OBJECTIVES OF STUDY

The objectives of the research are to :

- 1) To estimate the type and amount of solid waste generation in Kuala Nerus.
- 2) To make recommendations or suggestions for future action to establish environmentally sound management of solid waste.

1.3 SCOPE OF STUDY

- 1) This research will be conducted by interviewing the residents around Kuala Nerus.
- 2) This research will be conducted among the communities around the area of Kuala Nerus.
- 3) This study will be conducted within three months (September- December 2015)

1.4 SIGNIFICANCE OF STUDY

The study will serve a good application of waste management by giving the opportunity for student to conduct field research like how to manage the waste by different type of waste and to expose to the good participation of student in solid waste management.

CHAPTER 2

LITERATURE REVIEW

In this chapter, I present the literature review by introducing some key concepts and terminologies that are relevant to this thesis, then a review of the related literature. The review of related literature will presents a general literature related to solid waste management and public participation with particular inclination to the research questions.

2.1 INTRODUCTION, KEY CONCEPTS AND TERMINOLOGIES

In this section, a number of concepts and terminologies are explained. These include waste and a few types of waste, waste management and public participation.

2.1.1 WASTE

United Nations Environment Program (UNEP), 2010, defined wastes as substances or objects, which are disposed of or are intended to be disposed of or are required to be disposed of by the provisions of national law. Waste also refers to “an item, material or substance you as an individual consider useless at a given time and place”. Waste is a dynamic concept which can be defined in different ways. In most cases, the definition of waste depends on the type or category of waste under consideration. Some of the dominant types of waste include; municipal waste, solid waste, hazardous waste and, electronic waste. I will define municipal and solid waste, which are relevant to this study.

Municipal Waste (MW)

Dawda Badgie, Mohd Armi Abu Samah, Latifah Abd Manaf, Azizi B. Muda, 2012, take municipal waste to refer “to wastes from domestic, commercial, institutional, municipal and industrial sources, but excluding excreta, except when it is mixed with solid waste”.

It is however necessary to note that in developing countries, many a times it becomes difficult or even impractical to put a line between excreta and solid waste. In many instances, solid waste mixes with excreta to the extent of being potentially hazardous to human health.

Solid Waste (SW)

Solid waste, also known as garbage is not very different from municipal waste. This study takes on the definition by the State of the Environment Report for Malaysia that defines solid waste as “organic and inorganic waste materials produced by households, commercial, institutional and industrial activities that have lost value in the sight of the initial user”. I found it prudent to adopt a definition and meaning of solid waste that is in the context of the area of study.

2.1.2 SOLID WASTE MANAGEMENT (SWM)

Waste management refers to the “collection, transportation, processing, recycling or disposal of waste materials” (World Bank. 2012). It ought to be appreciated that waste management practices differ for developed and developing countries, for urban and rural areas, and for residential and industrial producers. The volumes and types of waste in these different sources of waste justify the difference in the waste management practices. It therefore implies that the methods appropriate in one setting may be incompatible within another setting. It is imperative to take into consideration the context of the waste source, to arrive at an appropriate method.

2.1.3 PUBLIC PARTICIPATION

According to the Oxford English Dictionary, OED, participation is “the action or fact of partaking, having or forming a part of”. Participation as a concept came to the lime light as a result of rising advocacy for the end of the top-down strategies to development action, in favour of greater inclusion of the subjects of the development programs. Seow Ta wee, 2009, agree that participation is a process and not just a solid product.

However, they are also quick to note that it is very difficult to establish a universal definition for participation. This indicates that different scholars, authors and organizations define and understand participation differently. Their definitions and understanding is often guided by the orientation and intent of the individual or organization defining participation, given the circumstances.

Although participation is widely known to be a free process, in some instances it practically requires that people are dragged into getting involved in operations that are of no interest to them, but they are coerced in the name of participation. Seow Ta Wee, 2009, look at participation as a concept that is closely linked to rural development. The conception that participation is an important ingredient in development presents a temptation to force participation at any cost. However, it is perhaps helpful to note that there is what Seow Ta wee, 2009, refer to as authentic participation, which is described as a result of a bottom-up process of development. The concept of participation requires clear interpretation and careful comprehension before it is adopted for any given purpose.

Seow Ta wee, 2010, try to explain the different interpretations of the concept of participation by use of four “terms”, that is; collaboration-input-sponsorship, community development, organization, and empowering. These terms are used to explain the different orientations in the participation discourse and the different terms represent different intentions or purposes for which participation is adopted by the implementers. Participation can be perceived as a means if it is adopted as a method of achieving success in a development program.

It can also be an end in itself if it is seen as “a process the outcome of which is meaningful participation”. In contemporary practice of participation, the former perception is more prominent. Participation is adopted as a catalyst to success of a beneficial undertaking in a community.

CHAPTER 3

RESEARCH METHODOLOGY

In this chapter, I present the methodology that I adopted for this study. The chapter describes a combination of quantitative and qualitative approaches to research, the research design, the data collection methods, sampling, data processing and analysis methods. My study area was located at Kuala Nerus, Terengganu. I have divided The area of Kuala Nerus into 10 sampling stations.

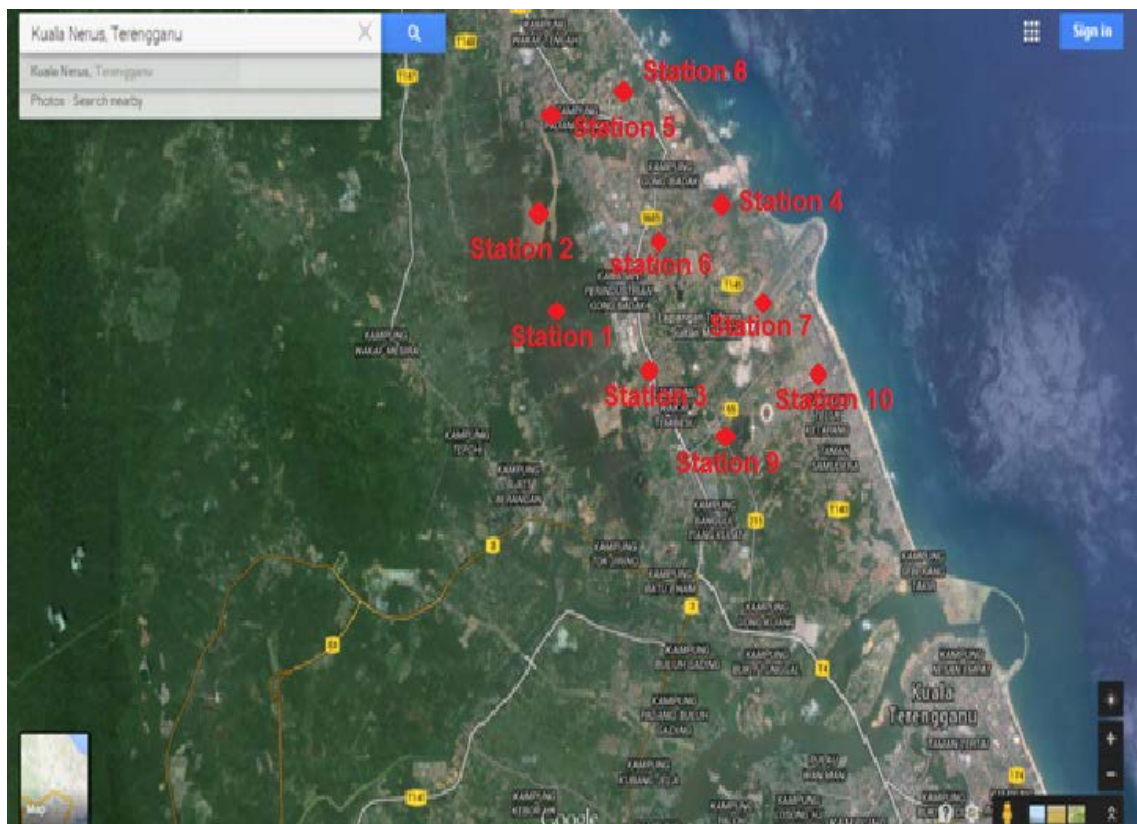


Figure 3.1 : Sampling stations in the study area

3.1 COMBINATION OF BOTH QUANTITATIVE (QT) AND QUALITATIVE (QL) APPROACHES

In this study I adopted a combination of both quantitative and qualitative methodologies to research. The objectives for this study (in chapter one) clearly show that the intention of this research was to explore the way the public engages in solid waste management, at what level and how the relationship between the local government and the public is with regard to solid waste management. Using a combined approach would therefore enable me to collect numerous forms of data and examine them from various angles to construct a rich and meaningful picture of a complex, multifaceted situation. The research questions were divided into two parts. On one hand, the first two research questions were addressed by use of quantitative techniques. On the other hand, the last two research questions necessitated the use of qualitative techniques. This decision was based on the conviction that for this study to yield meaningful conclusions, it had to draw on the advantages of using both qualitative and quantitative methods as explained below.

Quantitative

Quantitative research is applauded for the fact that the findings are generalisable and the data are objective. It was hoped that the findings from this study would help in reflecting what is happening in the whole of Kuala Nerus Town Council.

At the same time, it was important to have an amount of objectivity to dispel the concerns to the effect that qualitative research may be biased. Quantitative data and statistical analysis would also help in testing some hypotheses and increase on the validity of the findings from this study.

Qualitative

In this study, there was need for me to “dig deep” in order to get a complete understanding of the situation from the perspective of the stake holders in the solid waste management sector. Making statistical conclusions could not suffice in unveiling the picture of solid waste management in Kuala Nerus Town council from different perspectives. The perspective of the people could only be appreciated with the collection and analysis of qualitative data also. Qualitative research permits “understanding in context”. In this study, I tried to understand whether there was any kind of collaborative relationship between the public and the local administration (Town Council) in managing solid waste. The collaboration I was interested in was the public participation in solid waste management alongside the Town Council. Special focus was put on the challenges of involving the public in solid waste management. I was further interested in exploring whether there were any mechanisms put in place by Kuala Nerus Town Council to enhance collaboration in solid waste management with the public.

3.2 RESEARCH DESIGN

As already discussed above, I employed both quantitative and qualitative methodologies. This research essentially took on a descriptive survey design, seeking to “describe phenomena accurately” not only using quantitative data but also qualitative data. This research design aims at getting data from multiple cases at a given point in time so as to analyse relationships across a number of variables of interest.

This study was based on such a design because its quantification characteristic helps in consistent benchmarking (Bryman, 2004). However, cross-sectional studies usually lack internal validity (Bryman, 2004) and I tried to respond to this concern through the qualitative component of this study.

In this study therefore, the qualitative data was used to enrich the descriptions generated or from the quantitative data and thus build the picture of solid waste management in the study area, better. In doing so, aspects of a phenomenological study design to research were employed to guide qualitative data collection and analysis.

Since I was interested in finding out the beliefs and perceptions of the people regarding solid waste management, phenomenology was a paramount component to inform this research's study design. My epistemological stand was interpreted with inclination and intention to understand the way people "make sense of the world around them" and basing on that then I would also be able to understand the phenomenon. This allows the researcher to interpret the people's interpretations in light of the related concepts and literature. Ontologically therefore, knowledge would be constructed from the researcher's interpretation of the peoples interpretations.

3.3 DATA COLLECTION METHOD

The methods for data collection were dependent on the required data for each specific research question. However, generally considering that this study took on combination of both qualitative and quantitative methodology, I chose to use document review, observation and interview.

Depending on the kind of data that was required, I used the most appropriate data collection method to get the data from the different respondents. I therefore chose to use the different methods for different reasons.

3.3.1 Document Review

Document review is an unobtrusive data collection method which is non-reactive since documents cannot be influenced by the fact that they are being used. Organizations as well as government and in this case local government, produce many documents. These documents can potentially be used to acquire both quantitative and qualitative data. I requested for permission and consequently documents so I could derive relevant information from them. Although I hoped to readily find and access several documents like annual reports, survey reports, planning documents and other relevant documents. It had very revealing information about solid waste management in Kuala Nerus Town Council and the absence of other documents did not compromise the quality of the findings from this study to a worrying extent.

Some of the data from this document formed a precursor to the interviews with Town Council Officers. I felt that this would allow for more meaningful reflection and triangulation of issues from the documents in the interviews. This triangulation is usually necessary for purposes of examining information in documents, in light of other data sources, since documents may not be as objective as desired.

3.3.2 Observation

An observation is a very systematic and enables the researcher to generate numerical data from the observations. This being a study that is partly dependent on survey framework, it was hypothesised that the behaviour of the respondents would most likely be inferred, direct observation of people's behaviour with regard to their responses was therefore, done to check the accuracy of their responses. This observation was particularly used with the help of an observation schedule as a data collection tool. Residents, traders and market vendors were observed, to gather data for this study.

3.3.3 Interview

One of the reasons for adopting a combination of qualitative and quantitative research techniques in this study was because the research questions required different types of data. Face-to-face interview was used in place of a self-completion questionnaire. The reason for this choice is that I anticipated that the literacy levels of the potential respondents would vary. Not all the potential respondents were expected to possess the skill of reading, comprehending and writing. Because of this, it would not be easy to look for such respondents who possess those skills and therefore, a face-to-face structured interview was preferred also for standardization of both the asking of questions and the recording of answers.

Since the interview instrument was to be translated into the local language, it was deemed easier to ask the respondents face-to-face than leaving them to write the answers themselves. Interview method was used to collect data from residents, traders and market vendors.

3.4 SAMPLING

Data was collected by structured interview from 50 respondents. These comprised of residents, traders and market vendors from the Kuala Nerus Town Council, which were randomly selected. 30 interviews were also done with respondents who were purposively sampled considering their location and the information they were anticipated to possess. Other 20 interviews were conducted in each of the three randomly selected wards. Such a limited sample was used due to financial, time and manpower constraints.

The procedure of reaching the individual respondents to make up the sample for this study was based on convenience sampling. However, effort was made to have the sample drawn from a dispersed area, to avoid getting the sample from one place. Much as structured interviews were conducted, it was not deemed viable to choose the sample by random sampling.

This is because there was no established data base or list of all the residents, traders and market vendors in the Town Council thus making random sampling for individual respondents impossible.

Not all people who were contacted were willing to participate in the study by giving information that was required for the study. Some refuse, while others feared that they might not have the required information. Those who feared incompetence to give the required information were people who had either not gone to school or those who had not attained any qualification in education. They seemed to imagine that the information required was academic and thought that it required educational competencies. However, the reason could also have been that they had never participated in any kind of research study before so they did not have a picture of how to go about the answering of questions.

I therefore interviewed those respondents that were willing and had some time to spare to answer the interview questions. This also justifies the use of convenience sampling procedure which was adopted, but while keeping in mind the fact that the sample had to be got from a spread area.

3.5 DATA PROCESSING AND ANALYSIS

The quantitative data from the interviews, was coded and this data sheet prepared before the beginning of data collection. After the data had been collected, I went through the data pieces/ interviews at the end of each day of data collection. At the end of the data collection process and when all the codes had been entered into the data sheet, data analysis was done. Frequency tables were generated and cross tabulation was also made between relevant variables.

The data were then typed on the computer. Where after, emerging themes were identified and classification of the emerging themes done. The classification was continuously edited in light of the emerging data from interviews, so that the most relevant themes could be constructed. When the final classification of the themes had been constructed, discussion of the findings was done with regard to the literature review and the data from documents reviewed.

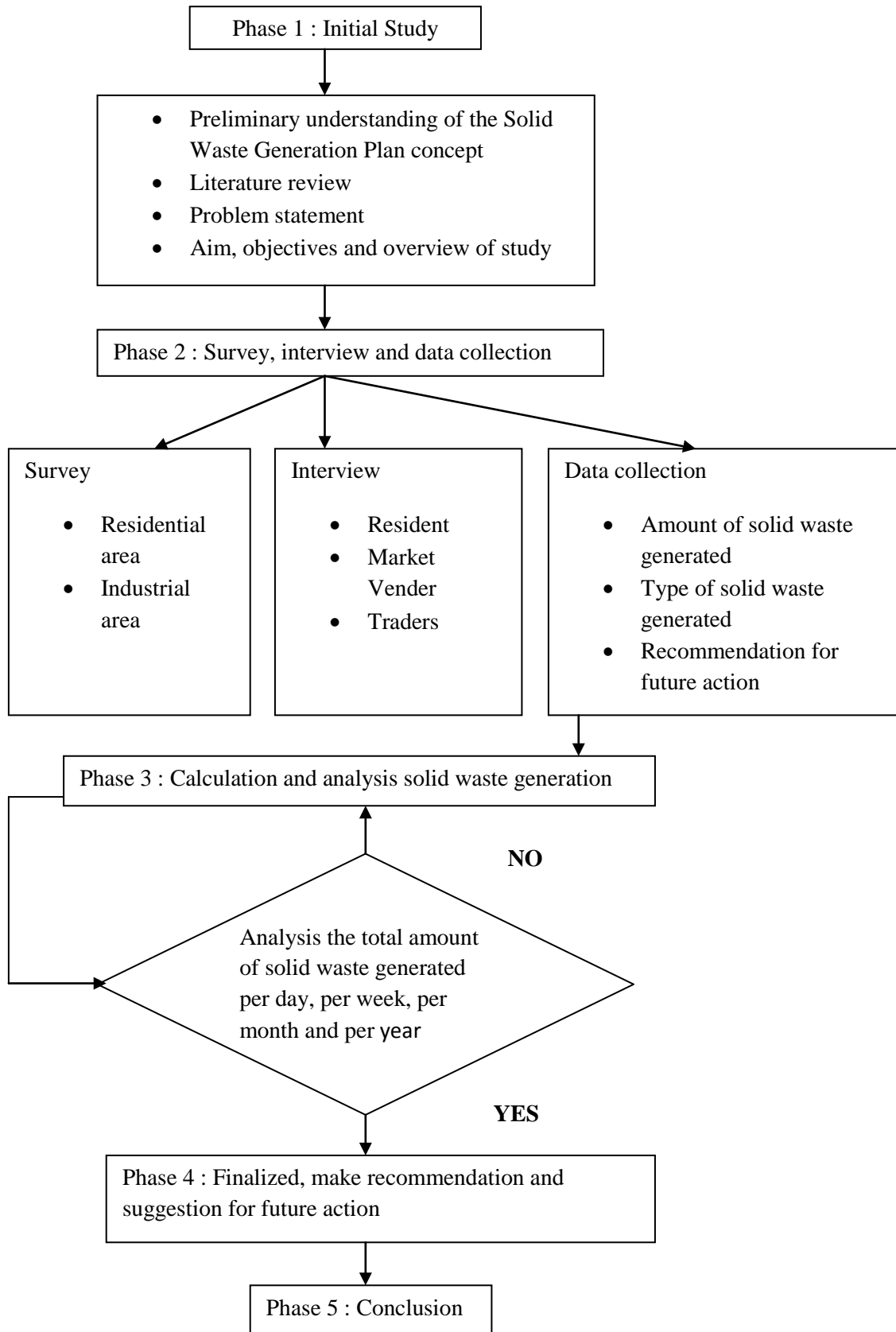


Figure 3.2 : Methodology Flow Chart of The Research

CHAPTER 4

RESULT

4.0 Demographic characteristics of types and amount of solid waste generation

There are different types of solid waste generation were collected around the area of Kuala Nerus which are plastic, paper, glass and metal. The amount of each type of solid waste generation collected is different according to the population, work and lifestyle of the people at the area. It is necessary to estimate the amount of solid waste generated, by its types within a community. Estimating the quantity of solid waste generated usually based on amount of waste generated per person, per day and per weight.

First of all, I have selected and divided the area of Kuala Nerus into 10 stations. For each station, I have collected all types of solid waste generation that consist of plastics, paper, glass and metal. To get the most accurate and consistent result of the actual types and amount of solid waste generated within a community, I have collected the amount of solid waste generation for each type for the 10 stations.

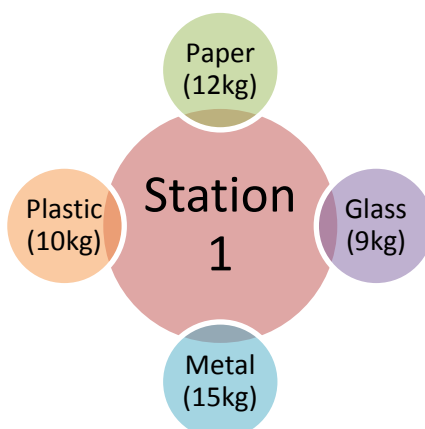


Figure 4.1 : Type and amount of the solid waste in a station

Table 4.1 : The total amount of solid waste generation in a day at 10 stations

Station Number	Types of Solid Waste	Amount of Solid Waste (kg)/day	Total amount of Solid Waste (kg)/day
1	Paper Plastic Glass Metal	12.00 10.00 9.00 15.00	46.00
2	Paper Plastic Glass Metal	13.00 9.50 10.30 15.00	47.80
3	Paper Plastic Glass Metal	14.70 13.50 9.90 10.00	48.10
4	Paper Plastic Glass Metal	13.00 11.80 9.80 13.30	47.90
5	Paper Plastic Glass Metal	12.10 13.90 10.50 13.70	50.20
6	Paper Plastic Glass Metal	16.90 20.10 15.50 15.00	68.50
7	Paper Plastic Glass Metal	12.20 9.40 12.40 13.00	47.00
8	Paper Plastic Glass Metal	13.80 12.20 18.00 12.50	56.50
9	Paper Plastic Glass Metal	11.90 13.60 8.50 14.00	48.00
10	Paper Plastic Glass Metal	10.40 15.80 9.10 17.60	52.90
Total			512.90

Solid waste generation rates are influenced by economic development, the degree of industrialization, public habits and also local climate. Generally, the higher the economic development and rate of urbanization, the greater the amount of solid waste produced. As the industrial process happen everyday, so the amount of solid waste produced also increases day by day. In this research, I have collected and calculate the amount of solid waste generated per day, per week, per month and also per year.

Actually, there are 18 station of solid waste generation in the area of Kuala Nerus. But I choose 10 of them for my research. But to calculate the total amount of solid waste generation in Kuala Nerus, I will calculate the amount of solid waste generated in all 18 stations.

The calculation of the amount of solid waste generation in Kuala Nerus

Per day $512.90\text{kg} \times 18\text{stations} = 9,232.20\text{kg/day}$

Per week $9,232.20\text{kg} \times 7\text{days} = 64,625.40\text{kg/week}$

Per month $64,625.40\text{kg} \times 4\text{weeks} = 258,501.60\text{kg/month}$

Per year $258,501.60\text{kg} \times 12\text{months} = 3,102,019.20 \text{ kg/year}$

This result shows that as the day passes, the higher the amount of solid waste generated by the community. This situation can be worse if it is not taking care well starting now. Imagine if 3,102,019.20kg of solid waste are generated in a year, how about after two years, three years and after that.

4.1 Demographic characteristics of respondents

50 respondents from the public were interviewed by structured interview instrument for quantitative data and by semi-structured interview instrument for qualitative data. All the quotes presented in this chapter are excerpts from the interview transcriptions from the data collection.

4.1.1 Respondent to structure interview

Number Of Respondent By Its Type

A total of 50 respondents were interviewed using a structured interview instrument, for quantitative data. The quantitative data was particularly to answer the first two research questions of this study. Table 1 represents the number of respondents from different of types.

The major categories of respondents in this study area is resident (see table 1). Kuala Nerus is largely a residential area although with numerous commercial centres and a few industries. It was therefore deliberate to have at least half of the total number of respondents sample to be drawn from the resident category.

Table 4.2 : Number of respondent by its types in the study area

Types	Number Of Respondents
Resident	20
Market Vender	12
Traders	18
Others	0
TOTAL	50

Respondent Categories By Gender

Table 4.3 : Number of respondents by its gender in the study area

Sex	Number of Respondent
Male	19
Female	31
Total	50

The table above shows that in the major respondent categories, more female respondents were sampled than their male counterparts. However, this was not purposively done, but was due to the convenience sampling procedure that was adopted in this study. For different reasons, female respondents were more accessible and willing to give information as compared to the male who always seemed to be busy doing their own work.

From the identification data, it was also discovered that 76% of the respondents were actually tenants in Kuala Nerus Council, either renting the residences where they stay, or the commercial premises where they operated/worked from. Only 12 respondents (24%) owned the residences or the commercial premises where they were found.

Respondent's Highest Educational Level

Figure 2 represents the educational level of the respondents with who structured interviews were done. The majority 35 out of the 50 (70.0%) of respondents had secondary level as their highest education level while only 15 respondents had finish their education until primary level. The number of primary level respondents was also considerably high.

Table 4.4 : Educational level in the study area

Educational level	Number of respondents
Higher education/university	12
Secondary level	30
Primary level	8
Never went to school	0

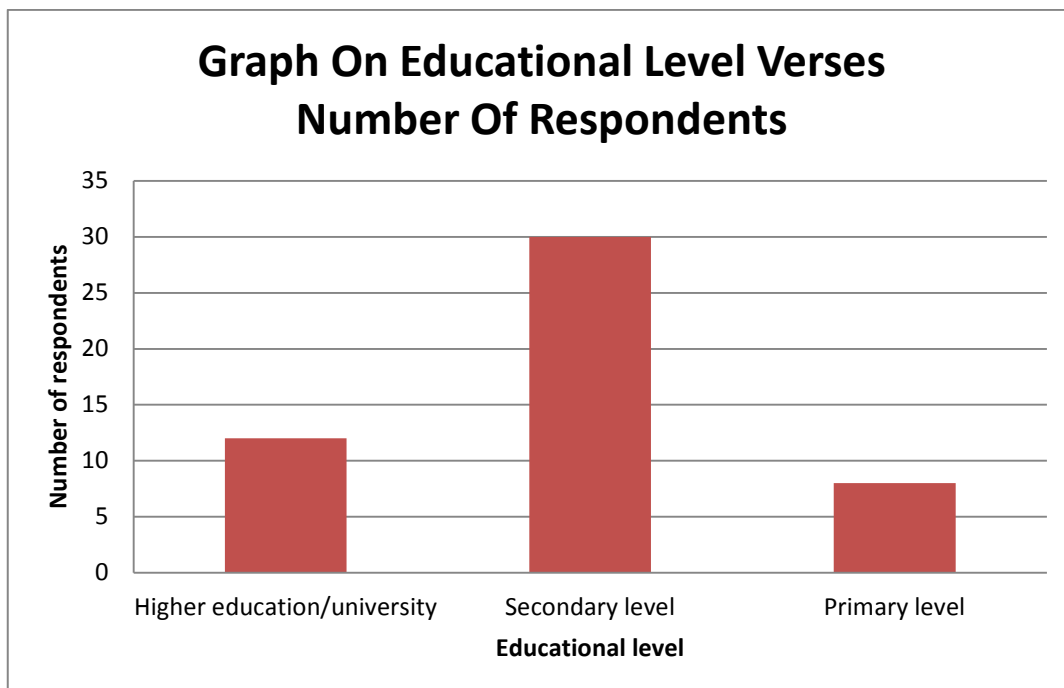


Figure 4.2 : Respondents level of education in the study area

The number of family members

Most of the resident that had been interviewed around the area of Kuala Nerus live in the house with their family. Most of the family consists of more than five members in a house. Beside of that, there are houses that were rented by a group of people who live there due to their work or study. Usually that kind of group rarely been at their houses during the day and only come home after finishing their work or classes.

Table 4.5 : Number of members in a house

Group	Number of members in a house
Family	29
Workers	8
Student	13
Total	50

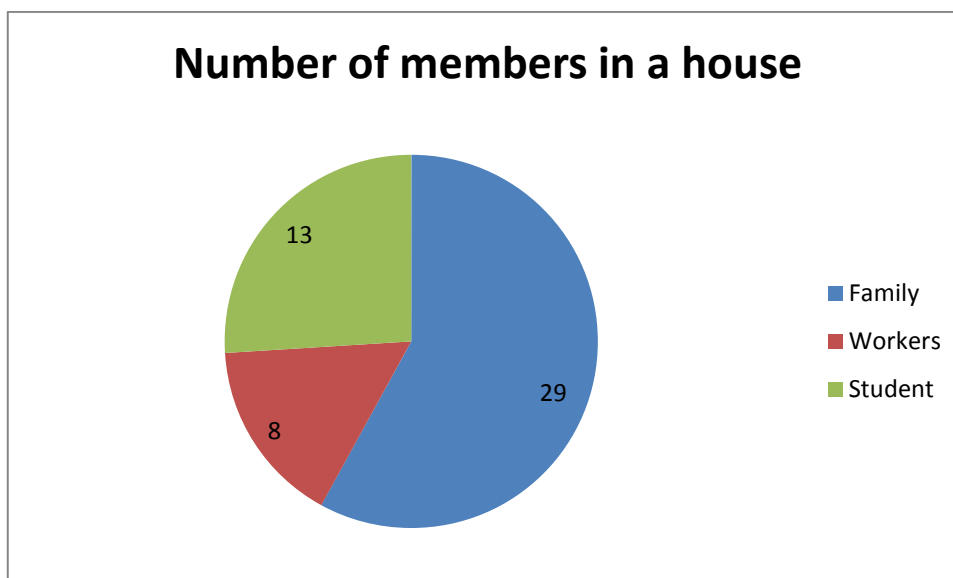


Figure 4.3 : Number of members in a house

4.2 Ways of public participation in Solid Waste Management

4.2.1 Primary waste management

The respondents were asked whether they possessed and used waste containers in their homes (for residents), at their shops (for traders) and, at their stalls (for market vendors). This was asked to establish, at that level, whether the people bother to have their solid waste collected in containers. Table 5 represents the responses of the respondents from the three wards.

Table 6 : Use of waste container in the study area

Type of respondents	Possession of waste container		Total
	Yes	No	
Resident	12	8	20
Market Vendor	7	5	12
Trader	12	6	18
Other	0	0	0
Total	31	19	50



Figure 4.4 : Own waste container in house

Most of the residents who possessed and used waste containers were more than those who did not have or use them. However, there were more residents who did not use waste containers to collect their solid waste, as compared to those who used them. Besides, the majority of the market vendors had containers they used to collect their waste.

On the side of the traders, the majority had waste containers. Out of the eighteen traders interviewed in this study, only six of them did not have waste containers at their premises. This data was in consonance with what was observed.

The respondents were also asked whether they tried to do any kind of solid waste sorting, simply by way of separating some types of waste items from the rest. This was to base on their own discretion of what types of waste they felt should not be mixed with other types for whatever reason. The responses to the question “Do you sort the waste generated in your home/shop/stall/premises?” are represented in table 6.

Table 4.7 : Waste sorting by the respondents in the study

Types of respondent	Whether waste is sorted		Total
	Yes	No	
Resident	14	6	20
Market Vendor	4	8	12
Trader	6	12	18
Other	0	0	0
Total	24	26	50

From table 6, the findings indicate that the majority (52%) of the respondents do not sort their waste. All the waste is put together and disposed of without any separation. However, there is number responded that they practiced waste sorting as compared to the biggest number of respondents responded “NO” to whether they sorted the waste generated in their premises.

When a cross tabulation is done for responses to whether one possessed a waste container and whether one sorted their waste with consideration to level of education, gives an interesting finding. 13 respondents who did not use waste containers claimed to sort their waste. Table 7 shows the cross tabulation between waste container possession, waste sorting and level of education of the respondents.

Table 4.8 : Significance of educational level in use of waste container use and waste sorting

			Possession of waste containers		Total
Whether waste is sorted			Yes	No	
Yes	Highest level of education	Never went to school	0	0	0
		Primary level	1	3	4
		Secondary level	12	6	18
		Higher institution/university	6	2	8
No	Highest level of education	Never went to school	0	0	0
		Primary level	1	3	4
		Secondary level	8	4	12
		Higher institution/university	2	2	4
Total			30	20	50

Considering the highest level of education of the respondents in relation to their use of waste containers as well as sorting waste, the data revealed that 50% of the primary level respondents both possessed waste containers and also did some sorting of the solid waste, while 16.6% of them neither possessed waste containers nor sorted their waste.

In one of the station of Kuala Nerus which is at Pantai Mengabang Telipot engaged in somewhat serious problem which is not the normal one when solid wastes are thrown away on the land of the beach by the community(see photo 1).



Figure 4.5 : Solid waste thrown away on the land by the community

4.2.2 Waste Disposal Practices, WDP

Consideration for waste reuse before disposal

In order to establish the level of concern and effort by the public, in solid waste management, respondents were asked questions regarding their waste disposal mannerism and practices.

When asked whether there were any items from what would qualify as waste that they reused, only 21.7% of the respondents indicated that they reused some items. The majority did not have any items that they felt were reusable. Those who responded “YES” to this question were asked to specify the kind of items they reused. During the interviews, I requested some of the respondents to say what they used such items for.



Figure 4.6 : Reused basket as waste container

Some of the items that they specified are paper boxes, empty plastic bottle, plastic tins, mineral bottles and so on. Like paper boxes, they reused it as the waste containers (especially the traders in shops and merchandi stores). Some of the respondents said that they used the plastic bottles for buying paraffin and cooking oil for domestic use and also for the cooking at home. Plastic tins like those formally used for packaging cooking ingredients were retained by the respondents for the same purposes. Whenever they buy other ingredients in sachets or paper packaging, they would store such new items in the old empty tins. Others said, they used them for storing sugar in place of sugar-bowls since some could not afford the bowls.

Beside that, the old cans were reused as waste containers in some homes as well as by the some traders who could dump in the waste which was not needed or peeling from the customers who needed to be helped out to remove the dirt so as to avoid going with it at home, for instance banana peelings, fish covers and potato peelings too. Polythene bags; some respondents recounted that they used old polythene bags for carrying items from the market (instead of buying new ones each time they do shopping).

Role players in solid waste disposal

The respondents were asked to reveal who takes the solid waste from their premises, for disposal. The responses by the interviewees are represented in the figure.

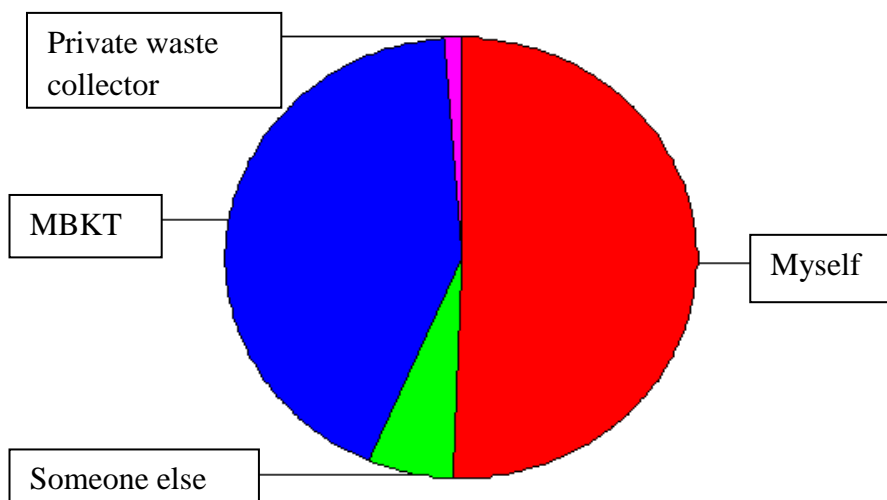


Figure 4.7 : Responses on who takes the waste from the respondents' premises, for disposal (in %)

The biggest proportion of the respondents takes the solid waste for disposal by themselves. (The response “myself” implied that the person who was interviewed is the one who carries the waste away by themselves. The response “someone else” implied that another person other than the one who was interviewed in a residence, or commercial premises, took the waste away for disposal.)

A relatively big proportion on the other hand let MBKT to pick the waste from their house or premise. On other hand, they used a private waste collector to pick the waste from their premises at a fee. (Private waste collectors encompass both those individuals who take it upon themselves to collect solid waste from domestic and commercial premises, to a collection centre/landfill/dumping site, as a way of earning a living; as well as registered commercial waste collection companies.)

It is only a very small proportion that had their solid waste picked by the private waste collector for disposal. On their part, the private waste collector explained that they have only one truck which they use to collect solid waste from the most problematic areas. Because they do not have enough transport facilities, it is impossible for them to collect all the solid waste generated in the resident areas. The clerk elaborated by saying;

“The problem now, is that we do not have an official landfill or dumping site for our private waste collector like us. But we have communicated to Kuala Nerus Town’s Council who have a dumping site in Kuala Nerus to allow us also take our solid waste to their landfill. Even then, transport is a problem to us. The garbage is quite a volume and we have only one vehicle, so we are limited by transport facilities.”

For purposes of establishing whether the respondents cared to know where the solid waste they generated was taken for disposal, they were asked to tell where this waste was taken. There were predetermined options (developed during the pre-test of the structured interview instrument) that the respondents had to respond to. Figure 4 presents the responses by category of respondents.

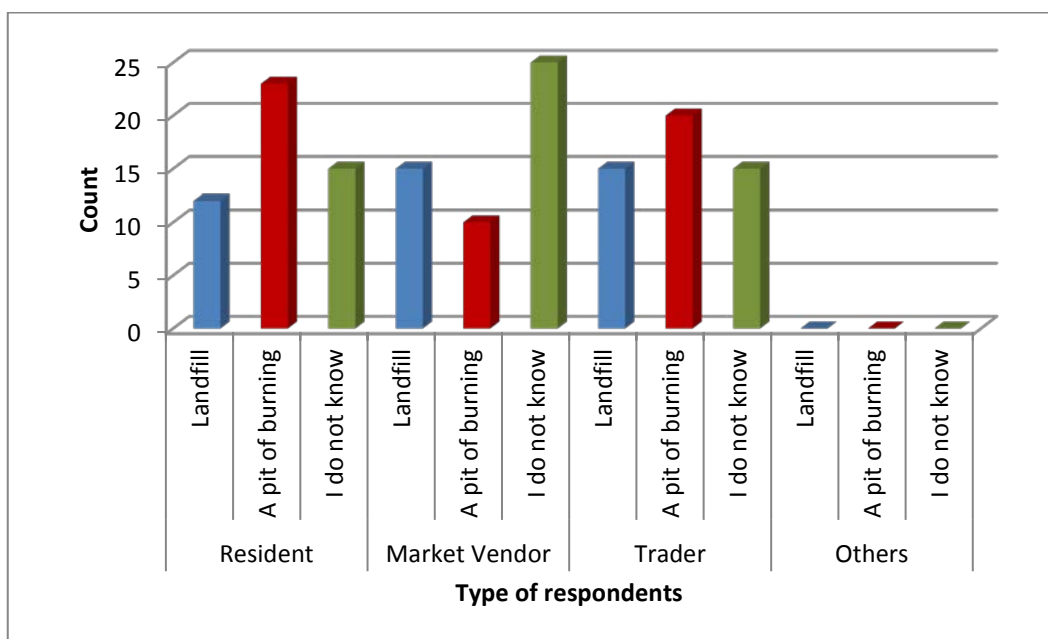


Figure 4.8 : Respondent’s knowledge on where the waste is disposed of

The data shows that apart from the market vendors, in all the other respondent categories “pit-burning” was the most popular method of solid waste disposal. The biggest proportion of market vendors do not know where their waste is taken for disposal. Generally across the different respondent categories, a considerable proportion does not know where the solid waste is taken for disposal. Few respondents indicated that the waste is taken to a landfill for disposal.

Illegal dumping

A number of respondents expressed concern about indiscriminate illegal dumping practices by some people in the Town Council. For example one resident of Kuala Nerus revealed that:

“We were dumping waste at a nearby place but we were stopped by certain people though some other people have continuously dumped waste at the place. Many people give their waste to irresponsible people who dump the waste wherever they want. There is also a vehicle that collects waste but people have decided to dump waste at a nearby bush. Since the area is residential, the tenants lack dumping space and resort to desolate land and bushes.”

From my own observation as I collected the data, there were so many areas where such indiscriminate illegal dumping of solid waste was done (see photo 2). To some people, any place that is not under activity was a potential dumping place. It was observed that people dumped waste along the paths, by the roadsides, in incomplete building structures, in bushes and in bare plots of land without any structures.



Figure 4.9 : Illegal dumping waste at nearby bush by resident

Voluntary public responsibility on proper solid waste disposal

A direct question was posed to the respondents to establish their practice when they found solid waste that they themselves have not generated. The question was very clear “what do you do about waste you find outside your home/business premises?” and two alternative responses were given “pick it and put it in a nearby waste container” and “move on”. Only 26 out of the 50 respondents said that they pick such waste and put it in the proper disposal place. The other 24 respondents said they just move on for as long as that waste is not generated by them. Figure 5 represents the respondents practice by category.

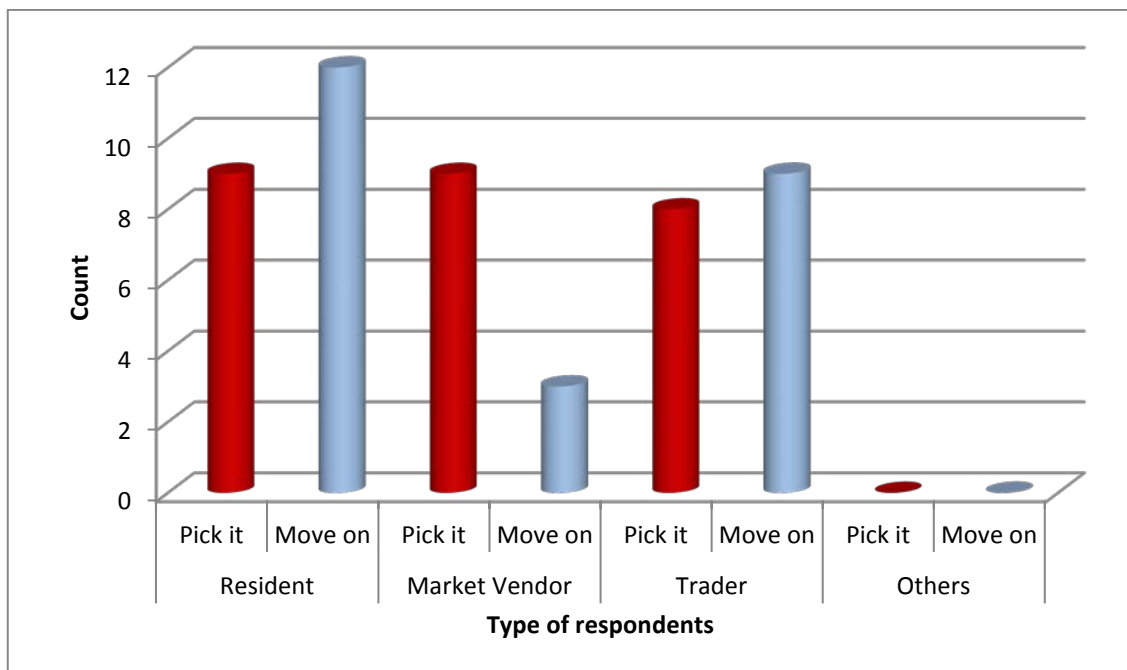


Figure 4.10 : What the public does to waste outside their premises

4.3 How else the public can participate in solid waste management

4.3.1 Possibility for waste reduction

A number of questions were posed to the respondents by structured interview to find out what they think they can alternatively do to manage solid waste better. The questions revolved around the possibility of waste reduction in terms of avoiding waste and item reuse, what they think about waste sorting and whether they think working together as members of the public and, with the Kuala Nerus Town Council authorities was a welcome possibility.

The findings indicated that the majority (62%) of the respondents to the structured interview felt that it was not possible for them to reduce on the amount of waste they generated. Only 19 respondents out of the 50 interviewed could think of some other ways of waste reduction.

When these respondents were asked to state how they could reduce the amount of waste they generated, they mentioned ways like reducing on the packaging from where the purchases are made, using the packaging materials over and over again to avoid more of them whenever purchases are made.

Besides by changing the types of foods bought, by sorting the waste so that the peelings can be given to farmers and the plastics given to those who need them for recycling, minimising on the use of papers and, cooking only an amount of food that the family will finish to avoid food left-over. Table 7 represents the responses to the possibility of reducing the amount of waste generated.

Table 9 : Responses to whether it is possible to reduce on amount of waste generated

Is it possible to reduce on the amount of solid waste generated	Frequency	Percent	Valid percent
Yes	19	38.00	38.00
No	31	62.00	62.00
Total	50	100.00	100.00

The Town Council Health Inspector explained that the people in the Town Council, TW could do something on solid waste reduction. In his own words he said,

“The community has a duty to reduce generation of refuse itself. Sometimes someone may buy a shirt from Kuala Terengganu (city) with box paper but they can leave such package material behind and just carry the shirt.”

CHAPTER 5

DISCUSSIONS

5.0 The Amount of Solid Waste Collected

After collected all the solid waste generated by the communities around the area of Kuala Nerus, I found that the amount of solid waste generated in a day show the high level. This is because the less awareness on the importance of solid waste management in that area. Besides, after comparing with the amount of solid waste generation in a whole state of Terengganu in years before, it can be seen that amount of solid waste generated in a new district like Kuala Nerus show that it is at the high level where it consist 2/4 of the whole amount of solid waste generation in years before.

Form the data that had been collected, the area which is at station 6 that have the high level of amount of solid waste generated is the high dense places. It consist of UMT, UNISZA, factories, IPG Kampus Dato' Razali Ismail , MRSM and so on. The communities at that area produces the high solid waste than the other area. While, at station 1 has the lowest level of solid waste generation than at other places because it only consist of residents houses.

From the observation, it also can be seen that there are communities with high level of education that aware on the importance of solid waste management but do not practice it in the real life. They know the sequence but still take it simple. While most of the market vendors and traders both leave the solid waste management to the authorities (MBKT) as they say that they had paid for their services.

5.1 The Level Of Public Participation In Solid Waste Management In Kuala Nerus

The current level of participation of the public in solid waste management in Kuala Nerus is not negligible but at the same time, it has not been practically significant in reality. The current level of participation though is low but it is useful for future planning and anticipation for more meaningful participation of the public in solid waste management in Kuala Nerus.

5.1.1 The Prevalent Participation

The majority of the public in Kuala Nerus Town exhibited concern and an amount of sensitivity about solid waste. The findings show that the majority proportion of the respondents possessed waste containers for their solid waste save for the market vendors in the town. It was established that particularly in Kuala Nerus Town, there was a private arrangement within the main market areas in such a way that it did not necessitate everyone to have a solid waste container.

Several vendors therefore did not find it necessary to use waste containers yet they paid for cleaning of their premises. But at the area of station number two which is at Manir, most of the residents there practiced “pit-burning” of the solid waste. It is in Manir where most residents took on disposal by burning at a waste pit. This could explain why most of them did not have waste containers because the waste is taken straight to the pit other than first kept in a container beside their house or shop. The use of different materials also display the innovativeness of the people in keeping the solid waste in one place before disposal.

Across the different station in Kuala Nerus Town, sorting of the solid waste is less adopted. The findings revealed that even those who said they sorted their waste, many of them had already declared that they did not possess waste containers. It is not clear and quite unrealistic for one to sort waste without having it in a container.

The participation of the public in as far as waste sorting is concerned seems to be at a low level. There seems to know that it helps to sort waste but few were practicing it. When there is no motivation for sorting of the waste, it is only taken to be time wasting to the people. Those who took time to do some sorting were mainly sorting out materials that can either be used as feeds for animals or for manure.

Table 5.1 : Generation of solid waste in Malaysia By State (1996-2009)

State	Municipal Solid Waste Generation (tons/day)							
	1996	1998	2000	2002	2004	2006	2008	2009
Johor	1613	1786	1915	2093	2255	2430	2578	2655
Kedah	1114	1215	1324	1447	1559	1680	1782	1835
Kelantan	871	950	1034	1131	1213	1302	1382	1423
Melaka	433	480	515	563	605	650	690	711
Negeri Sembilan	637	695	757	828	890	957	1015	1046
Pahang	806	879	957	1046	1125	1210	1284	1322
Perak	1284	1402	1527	1669	1795	1930	2048	2109
Perlis	165	180	196	214	230	247	262	270
Pulau Pinang	916	999	1088	1089	1278	1375	1458	1502
Selangor	2380	2595	2827	3090	3322	3573	3790	3904
Terrengganu	743	811	883	965	1038	1116	1184	1219
Kuala Lumpur	2105	2305	2520	2755	3025	3323	3525	3631
WP Labuan	NA	NA	46	70	74.3	81.2	86.1	88.7
Sabah	NA	NA	NA	1905	2021	2208	2343	2413
Sarawak	NA	NA	NA	1905	2021	2208	2343	2413
Total	13070	14589	15587	21452	23073	24969	26489	27284

Note: NA - Not available.

The table shows that Selangor state produced the highest quantity of municipal solid waste, followed by Kuala Lumpur and Johor. The total amount of waste presented in Table 2 (27284) is greater than the one reported by the Town Council. The trend shows that the waste generation keeps on increasing on yearly basis.

Although Kuala Nerus which is in the state of Terengganu does not show the highest amount of solid waste generation but in the table above, we can see that the amount of solid waste generation in Terengganu increases by years.

Those who had a motivation in terms of economic benefits were seriously sorting the waste either for sale or for exchange with items that would otherwise be bought like milk. The knowledge base for recyclable items is also still low. There are even people who have no idea of any item that can be recycled. All the items on the list that was presented to the respondents during the interview were recyclable. Amazingly, people were more aware of plastics as a recyclable item.

Only few people thought of other items like paper and metals as recyclable items. It becomes difficult for people who lack information to fully participate in solid waste management. Here, I recommend that the Kuala Nerus Town Council should plans a strategy or a way on how to persuade the people to think of waste management related business ventures, but this would not even have been necessary if the people had the information about the benefits. The lack of information could be the constraint to public participation in solid waste management.

Table 5.2 : The material composition in solid waste from various studies and sites (2001-2010)

Components	2001 ^a	2001 ^b	2002 ^c	2003 ^c	2004 ^d	2005 ^e	2005 ^f	2007 ^g	2010 ^h
Food waste & organics	68.4	32	56.3	37.4	49.3	45	47.5	42	43.5
Mix Plastic	11.8	16	13.1	18.9	9.7	24	NA	24.7	25.2
Mix Paper	6.3	29.5	8.2	16.4	17.1	7	18.5	12.9	22.7
Textiles	1.5	3.4	1.3	3.4	NA	NA	2.13	2.5	0.9
Rubber and Leather	0.5	2	0.4	1.3	NA	NA	NA	2.5	NA
Wood									
Yard wastes	0.7	7	1.8	3.7	NA	NA	4.41	5.7	NA
Ferrous	4.6	NA	6.9	3.2	NA	NA	2.72	NA	NA
Glass	2.7	3.7	2.1	2.7	2	6	NA	5.3	2.1
Pampers	1.4	5.5	1.5	2.6	3.7	3	NA	1.8	2.6
Other	NA	NA	NA	5.1	NA	NA	NA	3.81	NA
Total	2.1	1.9	8.4	5.3	18.2	15	21.93	2.6	1.8
	100	100	100	100	100	100	100	100	100

Note: NA - Not available.

The level of item reuse is similarly low in Kuala Nerus Town Council. Few people acknowledged that they have items they reuse before they think of disposal. The stimulus for this however was not really the consciousness to reduce the volume of waste generated. The people do not deliberately reuse items in order to reduce the solid waste volume but are rather pushed to reuse because they do not have much choice. They are constrained by the inability to afford acquisition of new items, so they take on reuse as a survival alternative. This may be a good place to start though with a change of attitude so that even in the midst of greater affluence which according to UNEP (2007) places demand impulse for more consumption. From the items that were that were mentioned, there is an impression that there may be many other items that can be reused and thereby reducing on the volumes of new solid waste generated.

The current level of voluntary responsibility for proper solid waste management is low but not negligible. The majority of the people do not seem to assume responsibility voluntarily for solid waste that is not generated by them. When waste is found outside their premises, people are not concerned about such solid waste. It seems they take the Town Council authority to have responsibility over such solid waste.

Such areas as road sides, trenches and public open areas like play grounds and land reserves for the local government. Much as these areas belong to the public, because they are to be used for public interest, people do not show interest in voluntary care by way of picking up such waste and putting it in the rightful place. Even for those who may have the will may be limited by the facilities that can make such responsibility attainable. It may work well if and when there are waste bins for example within reach. People may feel that is so burdensome to carry waste for very long distances for the sake of being voluntarily responsible. It may only be realistic and easier if a waste bin is nearby so that it is not inconveniencing for someone to voluntarily engage in proper solid waste management.

CHAPTER 6

CONCLUSION AND RECOMMENDATIONS

This chapter presents the conclusive statements drawn from the discussion of the findings and then some recommendations to Kuala Nerus Town Council on the way forward on how to reduce the amount of solid waste generated in this town and also with regard to public participation in solid waste management.

6.0 CONCLUSION

The amount of solid waste generated in Kuala Nerus is quite high although Kuala Nerus is the new district in Terengganu. Compared to before Kuala Nerus had declared as a new district, this area known in Kuala Terengganu district, the amount of solid waste generated in this area is quite high. This is because of the urbanization and the increase of population in this area. The situation become worse when the community does not care about the solid waste generated by them each day. They thought that it is okay to generate such a lot of solid waste without well care from every party. As the conclusion, everyone should increase the awareness in the important of reducing the amount of solid waste generated each day. Every party should cooperate in order to safe this area from becoming worse.

Besides, the level of public participation in solid waste management at present in Kuala Nerus Town Council is low. There is no structure that allows for a more synergistic relationship between the public and the Town Council authorities. The Town Council, being less than a decade old is more preoccupied with infrastructural projects at the moment leaving the solid waste management issue less attended to and with fewer resources for the venture.

This has consequently given room for people to dispose of waste carelessly since the issue has not been practically adopted as a priority in the Town Council as yet. Everyone has the discretion to decide what best suits them as far as solid waste management is concerned.

Waste reduction through waste reuse is a primary function of the public at the stage of waste generation. In Kuala Nerus Town Council, there has not been effort towards waste reduction. The people do not possess knowledge on the benefits to the environment and consequently sustainable development when the volume of waste is reduced. There is no appreciation of the fact that solid waste affects sustainable development. The required circumstances for effective solid waste reduction are not prevalent in Kuala Nerus Town Council given the low level of social capital established among the people.

Knowledge about the importance and benefits of sorting waste is one thing, and having knowledge on the recyclable waste material is another. People do realise that it is a good thing to sort solid waste so that not all of it is dumped together. The intention is to ease the management of the waste by having some of the waste items recycled. The knowledge base about recyclable items among the people of Kuala Nerus Town Council is minor and very low. The people know little about recyclable items and this in itself forms a barrier to waste sorting. For one to embrace waste sorting, one needs to know which items to particularly sort-out, without this knowledge, it becomes useless and unlikely so to happen.

From the attitudes of the people, it is very clear that not all is lost. The future of sustainable solid waste management in the town Council is bright but only so if the potentials of the people to participate are delicately and purposively tapped. There is willingness by the public to participate.

The time to act is now because if nothing is done immediately, the more time passes, the more complicated the solid waste management problem will get. The population is without doubt increasing day in day out and the impact on the environment is also becoming enormous. The damage on the environment is already noticeable in the Town Council as a result of the careless waste disposal practices. The situation calls for an immediate arrest as the only way to reverse the effects in future.

6.1 RECOMMENDATIONS

The 3R (Reduce, Reuse, Recycle) should be planted again in ourselves in order to increase the awareness on how importance to reduce the amount solid waste generation in the area of Kuala Nerus. The authority should enhance the law to make sure that every house, shop and premise should have their own waste container. So that, they can sorting the solid waste themselves. If they ignore the law, compound will be charged to them.

There are fertile prospects for public participation in solid waste management in Kuala Nerus Town Council. The best way to do is by showing the people that they are worth by involving them in the initial planning stages. The people's ideas should be included in the initial deliberations and discussions so that they can see themselves as part of the decision-making structure. This is important because the people themselves have been responsible for both the good and bad practices at present and therefore for any change to be concrete there is need to involve the people right from the start by way of consultations. This will also help in taking the relationship between the public and the authorities to another level of mutual understanding and interdependence. With this, the operations will most likely be smooth and less costly both politically and financially.

Apart from involving the people in taking the initial decisions, the Town Council should strategically plan for sensitisation of the people. Several solutions may be brought at table and agreed upon. But just like the findings show, the people feel that the first step should be to sensitise the public about the whole issue of solid waste management.

Although there is agreement that sensitisation should come prior to implementation of the solid waste management program, in actual sense, effective and meaningful sensitisation is planned when the whole program package is complete. That is when one can know what exactly to sensitise about and how. It is my suggestion therefore that sensitisation should not be done for the sake of it and basing on mere thought but after a common agreement on the program of solid waste management for purposes of being systematic and thorough.

The imminent bye-law by Kuala Nerus Town Council on solid waste management with a specific focus on waste collection fees structure is one of those items that need to feature in the sensitization. This the Town Council may be already planning but the concern should also be on the basis for determination of the fees structure. This is a critical issue and the fact that it will come in form of a law that will demand conformity; it requires utmost care on the side of the law makers. To be able to come out with an acceptable fees structure the Town Council authority should do a well planned and empirically supported consultation or survey that will ensure determination of a win-win financial legislation for solid waste collection and management.

The Town Council has been doing social networking with a few good-willed individuals. This is a good thing and thus a good base on which to launch a fully fledged campaign on networking. The potential for scaling up this venture should be explored and given attention because the Town council administration will need the members of the public and vice versa. There are people who possess or at least have access and control over useful resources that can be used for better solid waste management. Therefore social networking should be seriously considered as it will help in reaching cost effective ways of dealing with solid waste in the area.

Since there are potential economic benefits that the Town Council is aware of that can be attained from business in solid waste, a plan to give elementary training to interested members of the public may be worthwhile with time. It will be a positive investment for future solid waste management which is community led other than led by the administration because in that way, it will be cheaper and yet sustainable.

I lastly implore the administration of Kuala Nerus Town Council to target towards achieving communities of practice among the public segments. The Town Council may need to plan to cover the knowledge gaps of the people with an ultimate aim of empowering, motivating and provoking them to constantly think of effective and efficient ways of solid waste management. The people should be helped to understand the different alternatives so that they can make their choices in an informed way so that their waste management practices are not harmful to others but rather sustainably acceptable both socially and environmentally. In this way, sustainable development will have transformed from mere rhetoric to practice.

REFERENCES

- Dawda Badgie, Mohd Armi Abu Samah, Latifah Abd Manaf, Azizi B. Muda, 2012. Assessment of Municipal Solid Waste Composition in Malaysia : Management, Practice, and challenge.
- Hester, R.E. & Harrison, R.E. 2002. Environmental & Health impact of Solid Waste Management. Manchester. Royal Society of Chemistry.
- Seow Ta Wee, Indera Syahrul Mat Radzuan & Jamaluddin Md Jahi. 2008. Solid waste Recycling Programme: Public behavior. Proceeding International Conference on Human Habitat and Environmental Change ; 180-187.
- Seow Ta wee. 2009. Failure in solid waste recycling programme. What Should Local Authority Do? Case in Batu Pahat, Johor, Malaysia. CD. Proceeding of International Conference on University Community Engagement, Universiti Sains Malaysia, Penang.
- Seow Ta Wee. 2010. New Perspective Of Integrated Solid Waste Management In Malaysia. Proceeding 3rd International conference on Human Habitat & environmental in the Malay world.
- World Bank. 2012. Urban Solid Waste Management issues. <http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTURBANDEVELOPMENT/EXTUSWM/0,,menuPK:463847~piPK:149093~theSitePK:463831,00html>.

United National environmental Programme (UNEP). 2010. Municipal Waste Management Report: Status-quo and Issues in Southeast and East Asian Countries.<http://www.environmentalhealth.asia/userfiles/file/Municipal%20Waste20Report.pdf>.

APPENDIX 1

List of Publication and News on New District of Kuala Nerus

BERITA DARI AKHBAR

TAJUK : KAJI KUALA NERUS SEBAGAI DAERAH BARU
AKHBAR : HARIAN METRO
TARIKH / HARI : 20 OKTOBER 2015 (SELASA)



SEBAHAGIAN peserta melakukan perbincangan.

Kaji Kuala Nerus sebagai daerah baru

Kuala Terengganu: Majlis Bandaraya Kuala Kuala Terengganu (MBKT) memperuntukkan RM700,000 bagi menjalankan kajian terperinci mengenai keperluan dan langkah yang perlu diambil sebelum menjadikan Kuala Nerus sebagai daerah baru.

Datuk Bandar Datuk Mohamad Kamil Othman berkata, sebelum sesuatu tindakan diambil ia perlu diteliti terlebih dulu daripada semua sudut bagi memastikan perancangan rancangan tempatan dan penggantian daerah baru itu berjalan lancar serta sistematik.

"Pelbagai pendapat dan

saranan dikemukakan oleh semua pihak termasuk penduduk tempatan di kawasan Kuala Nerus perlu dinilai serta diguna pakai sekiranya ia mendatangkan kebaikan bagi menjayakan hasrat kerajaan negeri menjadikan Kuala Nerus sebagai daerah baru.

"Bagi menambah impak serta kemampuan Kuala Nerus sebagai daerah baru, kami juga disyaratkan membuat publisiti awal dengan menghebahkannya kepada orang awam," katanya selepas majlis Perasmian Bengkel Fokus Perbincangan Berkumpulan Sasaran Rancangan Tempatan Daerah

Kuala Terengganu (Penggantian) dan Rancangan Tempatan di Stadium Negeri, di sini, semalam.

Mohamad Kamil berkata, 200 peserta menyertai bengkel yang dianjurkan itu dan membabitkan jawatan-kuasa Kemajuan dan Keselamatan Kampung (JKKK), pegawai kerajaan, ketua jabatan, ahli majlis termasuk ahli persatuan di seluruh negeri.

"Kami harap mereka memanfaatkan kesempatan itu untuk mencari dan mengenal pasti keputusan terbaik melalui kajian yang dijalankan secara bersama dan terperinci itu," katanya.

metro - 20/10/15 - selasa

APPENDIX 2

Sample of Solid Waste Collected By MBKT in 2014

 GARBAGE COLLECTION			
JADUAL PERKHIDMATAN PUNGUTAN SAMPAH			
BIL	JENIS PUNGUTAN	WAKTU OPERASI	KADAR BAYARAN BULANAN (RM)
1.	PUNGUTAN SAMPAH RUMAH KE RUMAH	3 KALI SEMINGGU (AHAD, SELASA & KHAMIS)	3.00
2.	PUNGUTAN SAMPAH PREMIS PERNIAGAAN DALAM BANDAR	SETIAP HARI	6.00
3.	KUTIPAN BIASA		TIADA BAYARAN DIKENAKAN
	JALAN-JALAN UTAMA	SETIAP HARI	
	LORONG-LORONG	SELANG SEHARI	

APPENDIX 3

Photograph Taken During The Research



Waste container in a house



Reuse basket as waste container



Public throw away waste at the nearby bush

APPENDIX 4

Sample of Questionnaire Used In The Research

DEVELOPMENT OF SOLID WASTE MANAGEMENT PLAN in KUALA NERUS, TERENGGANU

Dear respondent, I am a student at Universiti Malaysia Pahang pursuing a degree in Civil Engineering and Earth Resources. I am in my final year of study and as part of the requirements for the program, I have to conduct a final year project. I am therefore carrying out a study into the challenges and prospects of public participation in solid waste management in Kuala Nerus Council. I request you to allow me ask you some questions which you can answer as you feel. The information you will give will be treated confidentially and will be anonymously used for purposes of writing the research report, and will not be used for any other purpose. Thank you very much in advance.

Nuradibah Hazirah Bt Mohd Zaki,

Interviewer

PART I

IDENTIFICATION DATA

1. Type of respondent

Resident Market Vender Trader

Other (specify) :

2. Premise Ownership

Private owner Tenant

3. Sex

Male

Female

4. Highest level of education

Never went to school

Primary level

Secondary level

Higher Institution/ University level

5. The number in family members

One person

Two persons

Three persons

More than five persons

PART II

ROLE PLAYED BY THE RESIDENT IN SOLID WASTE MANAGEMENT

6. Do you have any waste container in your home/shop/stall?

Yes

No

7. Do you sort the waste generated in your home/shop/stall?

Yes

No

8. Are there any items from your waste that you reuse?

Yes

No

Please specify :

9. Who takes the wastes from your home/shop/stall for disposal?

- Myself
- House keeper
- Someone else in the home
- Private waste collector
- MBKT

10. Do you pay for collection of waste from your home/shop/stall?

- Yes No

11. If yes, in your view, is the fee affordable?

- Yes No

12. Where the waste taken for disposal?

- Landfill
- Collecting centre
- A pit of burning
- I do not know
- Other (specify) :

13. How many times in a week is the waste taken from your home/shop/stall?

- Once
- Twice
- Daily
- I do not know

PART III**ROLE RESIDENT CAN PLAY IN SOLID WASTE MANAGEMENT**

14. Do you think that you can reduce the waste generated in your home/shop/stall?

Yes

No

15. If yes, how?

.....