

PERPUSTAKAAN UMP



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MACROSCOPIC STUDY OF WASTE MANAGEMENT BY DOMESTIC COMSUMER

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ABSTRACT

Solid waste generation in Malaysia is currently at an alarming situation. There is an issue on how the government and consumers manage their discarded waste nationally and small clusters. This study is about solid waste management among Malaysian society. The focus areas for this study is in the district of Kuantan, Pahang. With regard to the three types of the low-cost housing, moderate residential area and high-class areas, the comparison of waste management has been made. The purpose of this study is to find out how people in Kuantan manage waste generated, measure the weight of each type of waste that has been generated, comparing the waste generated in Kuantan with other big cities around Malaysia, and make observations regarding waste storage systems in every selected residential area. This study shows that food waste is the highest type of waste generated by the residents in every city. In addition, the waste storage system who applied in the study area is relatively good level because every house provides the garbage container in front of the house. The waste management by domestic consumers in all the study area is still at low level because no one of them show clear evidence for separation of waste produce.

ABSTRAK

Penjanaan sisa pepejal di Malaysia merupakan satu masalah yg perlu dibimbangkan. Kajian ini mengenai pengurusan sisa pepejal di kalangan masyarakat Malaysia. Kawasan tumpuan bagi kajian ini adalah di daerah Kuantan, Pahang. Dengan mengambil kira tiga jenis kawasan perumahan iaitu kawasan kos rendah, kawasan sederhana dan kawasan mewah, perbandingan mengenai pengurusan sampah telah dibuat. Kawasan perumahan yg di pilih ialah Taman Seriku mewakili kawasan kos rendah, Indera Mahkota 2 mewakili kawasan sederhana dan Indera Mahkota 5 mewakili kawasan perumahan mewah. Tujuan kajian ini ialah untuk mengetahui cara penduduk di Kuantan mengurus sampah yg dijana, mengetahui berat bagi setiap jenis sampah yg telah dijana, membandingkan sampah yg dijana di Kuantan dengan bandar2 lain di sekitar Malaysia, dan membuat pemerhatian mengenai system penyimpanan sampah bagi setiap kawasan perumahan yang dipilih. Kajian ini menunjukkan bahawa sisa makanan merupakan jenis sampah yg tertinggi dijana oleh penduduk di setiap bandar. Selain itu, system penyimpanan sampah yg diguna pakai di kawasan kajian berada ditahap yg agak baik kerana setiap rumah menyediakan tong sampah dihadapan rumah. Tahap pengurusan sisa pepejal oleh penduduk di setiap kawasan kajian masih berada di tahap yg rendah kerana tiada diantara mereka mengasingkan sisi pepejal mengikut jenis.

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CHAPTER 1

INTRODUCTION

1.1 General

Waste management is the most challenging task all around the world. Lately, waste management has become a major concern due to the environmental problems. The disposal of waste is very important. The proper management of waste should be applied to make sure the waste has disposed wisely. Improper and ineffective management of waste can cause harm to the health of the population and also give a negative impact on the environment.

In Malaysia domestic waste generated at an alarming rate, which mean faster than the natural degradation process. They also consumed resources at the speed exceeding the rate the material can be replaced. According to Jamal Othman (2002), Malaysia happens to produce the most municipal solid waste among selected Asian countries, beating the highly populated country Japan. One of the most effective waste disposal processes is recycling.

Urbanization, rapid industrial and increase in population lead to increase the production of waste generate by the community. One of the main problems faced by the domestic consumer is the management of waste, especially in urban areas. Solid waste management costs from the collection, accumulation, transportation to the extent that the disposal of garbage is very high.

Quantities of waste especially domestic waste need to be reduced in order to reduce government spending. Cost aspect is actually stimulating the better waste management system. However, as the charges imposed on society comparable to the cost waste management, local authorities hard to improve the quality of service to the community because of limited capital, employment, operations, vehicles and lack of equipment.

Due to cost management solid waste is increasing, then the recycling program implemented to reduce the quantity of solid waste discarded at source. The scholars suggested that the charges imposed on society also increased that the waste produced by society can be reduced.

In many developing countries in Asia, the population, urbanization, industrialization contributes was increase contribute to solid waste. For example, in India it was between 0.2 kg/capita/day and 0.5 kg/capita/day with 217 million people. Most of SW composition in the cities of developing countries is biodegradable organics. For examples, it was 65% in Jakarta and 72.41% in Surabaya. Whereas, in the Asian developed countries, such as in Japan, Singapore, Taiwan, and South Korea, these values were generally less than 45% (Yeny Dhokhikah, Yulinah Trihadiningrum, 2012).

Local authorities spend up to 60 per cent of their annual budget on waste management, which costs Malaysia between RM110 and RM130 to collect and dispose one tonne of garbage. That sums up to RM1.98 million to RM2.34 million per day or RM854 million per year at the current generation of 18,000 tonnes of solid wastes per day (Bernama, 2006).

Urban population is a country's leading producer of solid waste. High population growth and urbanization combined with economic growth has changed the peoples' patterns of consumption and contributes to increased waste generation and changes in the composition of the waste. For example, urban area in China produced about 190 million tons of municipal solid waste in 2004, and this compelled the Chinese government felt the need to develop projects such as the reduction of solid waste; act of packaging, reduction of carbon emissions, compost making and marketing programs

By recycling we can achieve the healthier lifestyle and at the same time we can protect our environment. Recycling process can save more energy comparing with burning the waste because burning gives negative effect to environment. The major effect of burning waste is air pollution which is harmful to human that breathe.

Recycling is a simple process less pollution and can produce many new things from waste material. The materials that normally can be recycled are plastics, bottle, glass, and paper. Even though “recycling” has been accepted worldwide as a form of waste disposal, Malaysia’s domestic waste recycling rate is still low at about five percent (Chandravathani, 2006).

1.2 Problem Statement

Our country Malaysia is one of the raise country among others raise country around the world. There are a lot of development occur in our country. High-rise buildings, urban residential areas, highways and towers are the example of development areas in our country. Since Malaysia became a raise country, there are lots of changes happen in Malaysian lifestyle and action.

Year by year, the growth of population in our country has been increased. Because of the changes, the development, and the increasing of the population growth, the production of the waste also increase. The production of waste gives the bad effect of environment and also healthier. As urbanization continues to take place in Malaysia, the management of solid waste is becoming a major public health and environmental concern in urban areas in our country.

Waste disposal, an important and final part of the process of managing waste; dispose solid wastes which are produced by human and animal activities. Nowadays, domestic consumers produce a lot of waste. But the domestic consumer’s level of awareness about waste management is still at the low level. Most of them not take cognizance on waste management.

They did not give their effort to know about how to manage waste that they produced. Nurturing population on waste disposal and recycling is rather difficult because most of them are not put their self involves or trained in doing so. The best approach to manage garbage disposal is to avoid creating waste in the first place (Siraj, 2006).

Since the domestic consumer's level of awareness about waste management is still at the low level, some of the domestic consumers often use the wrong method of managing their waste. Most of Malaysian is not have and exposure about the right method of managing waste. This is the most problem in Malaysia because the if Malaysian do not manage their waste well, the amount of waste produced cannot be controlled and increase year by year.

In Malaysia's rural area, most of the communities commonly burn their waste. The process of burning waste produced a lot of smoke that give harm to people and also can increase the level of air pollution in Malaysia. So, by doing this method, the waste can be burnt up and the amount of waste can be reduce but the impacts of the environment cannot reduce or it will increase the impact of the environment.

Malaysia river is the main water source and also the main source of Malaysian to search for their food such as fish and shrimp. But there are certain river in Malaysia have been polluted by the waste. Some people often dumping their waste into the river because they thing river is the suitable place to dump the waste and the waste can follow the river and go somewhere and disappear from their place.

By dumping waste into the river, it gives a lot of bad effect to the environment. The pollution of the river will increase and threaten the aquatic life. Other than that, the large amount of waste dumping into the river also can disturb the stream flow and will cause the blockage of waste.

1.3 Objectives of the study

The overall aim of this project is about to study the effectiveness of the management of solid waste in our country. Therefore, the main objective of this project is to know how our country domestic consumers normally manage their waste product and to measure the type of waste is generated by domestic consumers by accessing their waste.

The way how the domestic consumers manage their waste product actually influenced by their daily activities. Due to the bustle of working, doing a job, and have to commit with others commitment, many people did not recognize the importance of waste management. Waste management is rarely practiced by many people because they actually do not even try to get their self involve. This study also aims to compare waste management of consumer between three different classes of area that are low cost residential area, moderate residential area and high class residential area. After getting the waste data form these three types of a residential area, the comparison will be made with other cities result from previous studies.

Domestic consumers produce a lot of waste. The amount of waste is generated by domestic consumers actually influenced by the amount of goods and daily use. There are a lot of types of waste generated by domestic consumers but commonly waste produced are biodegradable waste, recyclable waste, inert waste, composite waste and hazardous waste. This study also will include the observation on the types of waste generated by the domestic consumer, the waste storage type and the amount of waste generated by domestic consumer.

1.4 Scope of Study

This study is about to know the management of solid waste management of domestic consumer in Kuantan area. In this study, this research is held on three different types of the residential areas in Kuantan which are low cost residential area, moderate residential and high class residential area and randomly choose about 20 houses in each residential area to collect their waste. The scope of study for this project

is to identify how domestic consumers manage the waste whether separating the waste according to the type of the waste or just combine all the waste in one plastic bag.

Other than that, measure the weight of the waste according to each of the types. This action is to identify the polarity of waste produce by the domestic consumers by taking the percentages of each type of waste.

1.5 Significance of Study

This study gives knowledge to the domestic consumers on how to manage the waste with the proper way. Waste management for the domestic consumer includes the generation of waste, packing of waste and storage of waste. Communities should know the proper way to manage their waste to make sure the waste generated can be managed well. This study may be teach or give some knowledge to domestic consumer on how the important of minimizing waste product, how to packing the waste in correct way and how to storage the waste in proper way.

Other than that, the domestic consumer's level of awareness about waste management also can be increased. The awareness of domestic consumer can be increased if they know the effect of waste generating to the environment and to the human health. So domestic consumers can implement the best way of managing the waste and also can prevent our environment from being threatened.

1.6 Conclusion

This chapter includes an introduction to this study, problem, statement, objectives, scopes of study, and significance of the study. In this chapter, it focuses more on the main idea of the project, what is this project about and what is the important about this project. The next chapter is about the review of the previous study which is chapter 2.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Solid waste management is a system that combines six essential elements that are in line with the concept of sustainable development in terms of public health, economics, engineering, conservation, artistic value, as well as environmental awareness. These six elements including the generation of waste, storage of waste, collection of waste, transportation of waste, disposal of waste and intermediate treatment of waste.

Domestic waste generates by communities in a large quantity. Domestic waste also can be classified in many categories. There are five broad categories of waste which are normally generated by domestic consumer. These five categories of waste are biodegradable waste, recyclable waste, inert waste, composite waste and hazardous waste. The proper way of waste management is really important to make sure all this type of waste can be settling down correctly.

The most popular method and also the method that can be accepted by world's population are known as 3R. 3R is consisting of three main methods which is Reduce, Reuse and Recycle. This type of method is the simplest way to manage the domestic waste and it can be done individually. There is some method that normally used to manage the wastes which are waste composition and waste disposal. The way how communities dispose the waste actually give the bad impact to the environment and also health because there are some people take the wrong action to dispose waste or to manage the waste.

The previous chapter introduces about waste management and describe about this study included introduction of this study, problem statement, objectives of the study, scopes of study and the significances of the study. In this chapter it will discuss about the review of the previous study that related to this study includes the element of waste management, categories of waste and 3R (recycle, reduce, reuse).

2.2 Element of Waste Management

The element of waste management plays an important role to make sure the management of waste is done well. The element of waste management consists of six main steps. All the six steps need to be done properly to make sure the flow of waste management is smooth from the generation of waste until the intermediate treatment of waste.

2.2.1 Generation of Waste

Generation of waste can be defined as the quantity, weight or volume of material and products that enter the waste stream before any action of managing it such as recycling, composting, and composting takes place. According to Jamal Othman (2011), the amount of waste was increasing in the recent years as the effect of the development of the country, the growth of economics and also the county's population, averaging 1.7 kg per day per person (Kathirvakle, 2003) as compared to 0.7 kg in 1987 (jusoh, 2002). According to Agamuthu (2001) many urban areas in Malaysia such as Kuala Lumpur, Petaling Jaya and Penang are projected to have a huge increase of solid waste.

According to the rapid growth of population, industrialization and urbanization in Malaysia, the amount of waste generated is increasing year by year in many municipalities. As stated by Hassan et al (2001), the higher degree of urbanization and the greater the economic properties, the greater the amount of waste produced.

Table 2.1: Solid waste composition at selected area in Malaysia

Types of waste	Percentage (%)			
	Johor Bharu	Klang	Petaling Jaya	Kuala Terengganu
Paper	19	27.5	23.6	15
Plastic/Rubber	12	7.7	9.4	3.5
Food	45	44	48.3	66
Glass/Ceramics	3	2.6	4	1
Metal	9	5.1	6	5
Wood	7	10.1	4.9	3
Textiles	5	2.9	4	1
Miscellaneous	-	0.1	-	5.5
Total	100	100	100	100

Source: Siti Rohana Mohd Yatim (2010)

The waste generates rate is different depends on several circumstances. There are some factors that influence the generation of waste which are climates, culture, lifestyle and economics.

2.2.1.1 Climates

Climatic factors influence the amount and duration of solid waste produced. For example, the hot-humid climates such as Malaysia experienced growing period is longer. For residential areas with full of tree yard, tree wastes in the yard collected not only a lot, but it also takes a long time compared with cold climates (Tchobanoglous et al., 1993). This type of factor cannot be controlled because the climate is fixed in an area or country.

2.2.1.2 Culture

In Malaysia, there are many races and also many cultural festival events. Every year in Malaysia there so many cultural festival events happen such as Chinese New Year, Thaipusam, and *Hari Raya Aidilfitri*. Every festive season there are many packaging and various food wastes to be seen. After the festival is finished, paper, bottles, cans, glass, plastic and decorative packaging with large amounts observed in the garbage container (Hasnah Ali, 2012). These are all solid waste that needs to be disposed.

2.2.1.3 Lifestyle

Today's lifestyles of society generally less environmentally friendly as much produce solid waste. There are many consumers that have less sensitive to the issue of environmental pollution. Total solid waste can be reduced if people are willing to change the lifestyle and habits to the more aware of the environment and reducing the economic burden of solid waste management systems (Hasnah Ali, 2012).

2.2.1.4 Economic

The process of urbanization and rising incomes are between two major factors contributing to increase solid waste (Ahmad Tarmizi 1992). Urban communities to generate more solid waste compared with the village community. This is reinforced by a case study done by Visvanathan (2003) made in the Indian state of findings suggests that there significant correlation between the increase in revenue per 1,000 rupees to increase the amount of weight solid waste (kilograms per month).

2.2.2 Storage of Waste

Waste storage can be defined as the placement of waste in a container before it transport to other places. The storage of waste is very important to make sure all the waste not scattered around the area or not be scattered by animal near the area. Store the waste in proper container also can protect the waste from spreading its stink or

uncomfortable smell that can disturb community around the area. Normally, in Malaysia every single house especially in urban areas has its own container in front of the house. The domestic consumer stores the waste into the container before the lorry collect the waste. There are some places that the lorry did not reach or collect the waste there. For that such area there are large container which is a communal container provided by the responsible party and all the waste from every house can be dumped there.

Nowadays, there so many types of storage system used in Malaysia. The type of storage used is different depends on the type of residential area. The usage of storage type also depends on its suitability. Since technology become increasing day by day, lots of inventions occur in our life. People try to invent something new to make everything easier. With great technology, people can save time, save energy and also save the cost. Some of the storage system used is very high in technology and give a lot of benefits to people around the world. But some storage system still doesn't use in Malaysia. In Malaysia there are some different types of storage used. The types of storage are listed as below:

2.2.2.1 Trash can or wheeled trash container

Trash can normally used as the premise that placed on the land which means every single premise placed on the land not the high rise building such as bungalow housing area and terrace housing area.

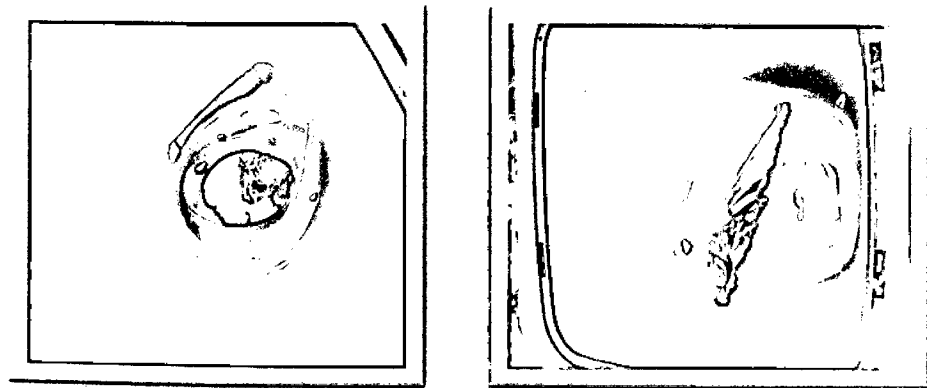


Figure 2.1: Trash can and wheeled trash container

2.2.2.2 Communal container

Normally this type of container used at high rise building area such condominium, apartment, and high rise building office. Communal container is a large container that can fill with large amount of waste. This type of container is suitable for the high rise building area because there a lot of residence stay there and generates a lot of waste.

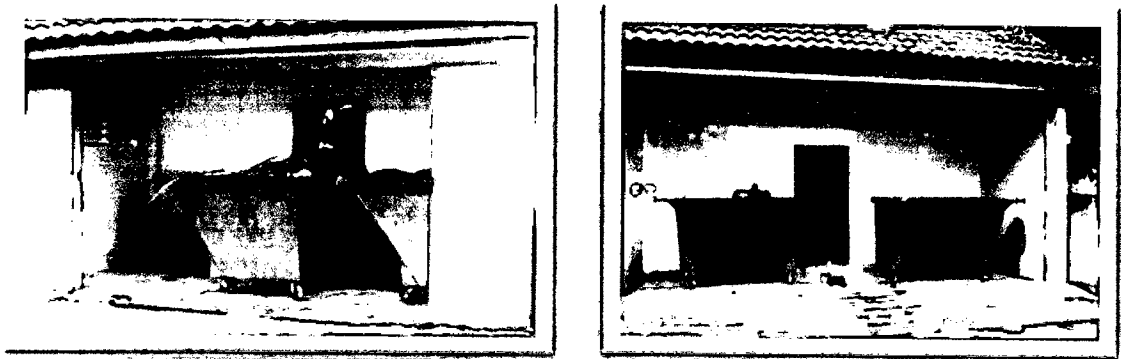


Figure 2.2: Communal container

(Source: www.sisa.my)

2.2.2.3 Spiral waste bin (SWB)

Spiral waste bin is one of the high capacity solid waste storage bins where solid waste will be compressed. In this way the capacity of solid waste can be stored is greater amount. It is suitable for use in areas with large quantities of solid waste, such as in condominiums and apartments.

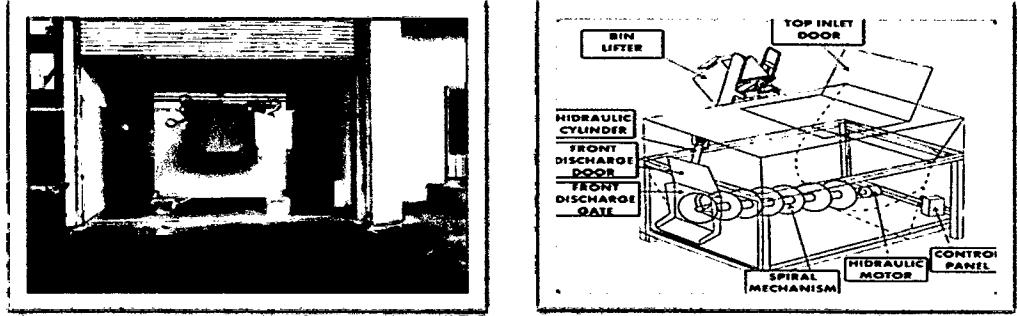


Figure 2.3: Spiral waste bin (SWB)

(Source: www.sisa.my)

2.2.2.4 Vacuum system

Vacuum System is an automated system that uses mains waste (refuse chute) and a suction method. Openings are provided on each floor to abandon the waste into the waste mains. Solid waste removed sucked through the underground main system uses a vacuum to be collected at the collection center. Waste will be collected by truck from collection centers. The cost of constructing this system is high but it is more clean and efficient. It is suitable for use in condominiums and commercial complex. In Malaysia, this system has been used at the KLIA, the Kelana Jaya Customs Complex and Maju Junction Complex.

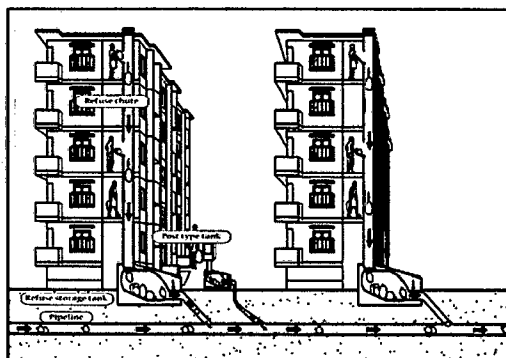


Figure 2.4: Vacuum system

(Source: www.sisa.my)

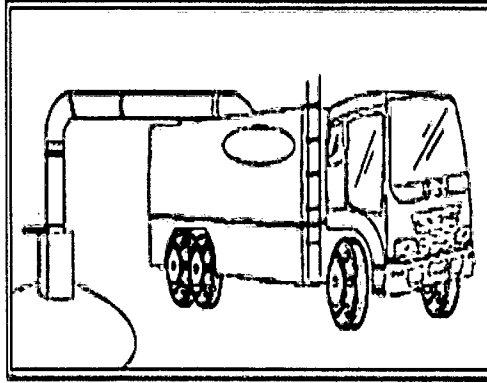


Figure 2.5: Waste sucking truck

(Source: www.sisa.my)

2.2.3 Collection of waste

Collection is the process of collecting domestic solid waste, bulky waste or recyclable materials in each premises bins or source of solid waste generated and gathers in the collection. Collection vehicles will then lead to either a solid waste transfer stations, incinerators, Fuel Facility Issues (Refuse derived Fuel (RDF), Facilities Acquisition Resource Retrieval (Material Recovery Facilities (MRF) or directly to the Landfill.



Figure 2.6: Household solid waste collection

(Source: www.sisa.my)



Figure 2.7: Bulk solid waste collection

(Source: www.sisa.my)



(a)



(b)

Figure 2.8: (a) (b) Workers collect the waste

(Source: www.sisa.my)

2.3 Categories of Waste

Domestic consumer generates a lot of waste every day. Domestic consumers not generating only one type of waste. Type of waste generated by domestic consumer is actually influenced by the lifestyle of the communities. The type of waste depends on what is the daily usage of the domestic consumers.

The type of waste generated also depends on the place of the waste generated such as the common waste generated at residential area is different with the common type of waste generated at industrial area. According to Salim Ramli (2010), There are five types of household waste that commonly produce by domestic consumers which are biodegradable waste, recyclable waste, inert waste, composite waste and hazardous waste.

2.3.1 Biodegradable Waste

Biodegradable waste is one of the waste that commonly found in household waste. According to A.J Gargia (2005), the biodegradable waste is the type of waste that presented high moisture content which is from 60% to 90%. This type of waste can produce a hazardous gaseous which is methane. If there are absence of oxygen, this much of this waste will decay into methane by anaerobic digestion. Methane gas is harmful because it was flammable. It can easily struck by fire and produce a wildfire if the methane gas is produced in large amount. The example of biodegradable waste is food waste, green waste such as flowers and fruits, manure human waste and sewage.

2.3.2 Recyclable Waste

Recyclable waste is the waste or used material that can be processed into a new product. This type of waste gives many benefits if every person in this world makes use of it. If domestic consumer manages this type of waste in appropriate ways, the amount of waste can be reduced. So, the effect of waste to the environment also can be reduced. As stated by S. Shahid Hussain (1990), Karachi municipal waste contains 89.5% of dry material and total of recyclable waste with plastics (9.85 %), paper/cardboard (10.1 %), glass (1.24 %), bones (1.85%), metal/tin (0.74%), rubber (0.2%), organic vegetable matter (54.55 %) identified as a component.