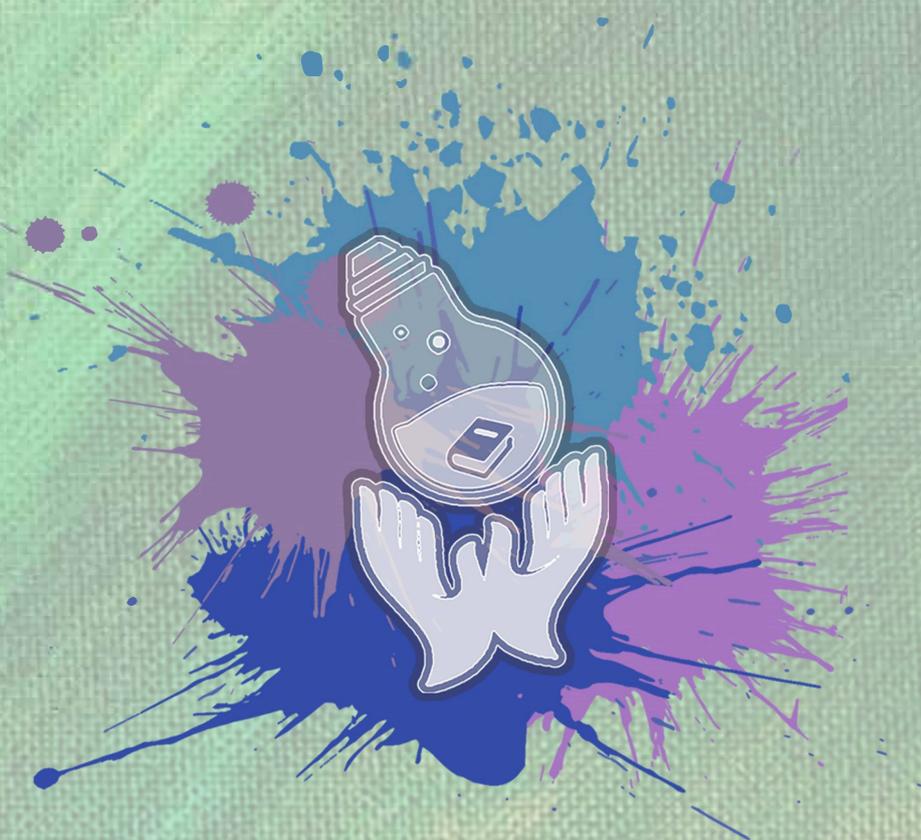




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2019



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# 4<sup>th</sup> UNDERGRADUATE **SEMINAR** 2019

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BUILT ENVIRONMENT & TECHNOLOGY

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**e-PROCEEDING**

eISBN-978-967-5741-97-5



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**FACULTY OF ARCHITECTURE, PLANNING & SURVEYING**

UNIVERSITI TEKNOLOGI MARA PERAK BRANCH

SERI ISKANDAR CAMPUS

# COMPOSITION OF PLASTIC WASTE IN CONSTRUCTION INDUSTRY

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## **Abstract:**

This paper aims to study the issue and problem of plastic waste and to identify its composition in new or existing products. The continuous demand of plastics caused the plastic waste accumulation in the landfill consumed a lot of spaces that contributed to the environmental problem. The ranking of the highest to the lowest plastic waste in municipal solid waste according to the categories of plastic containers. Some alternatives that have been developed to manage plastic wastes were recycling and innovation in construction industry. The innovations in construction industry may get a place to contribute as a solution for reducing plastic waste on earth. It's given a new value and price which may improve the economic growth. The innovation of plastic waste into new products can be applied either in production, building components or construction materials.

## **Keywords:**

Plastic waste; Polyethylene; Waste material; Solid waste; Recycling

## **1.0 INTRODUCTION**

Plastic plays a vital role in enhancing the standard lives of human being for more 50 years. It is a key of innovation of many products in various sectors such as construction, healthcare, electronic, automotive, packaging and others. The continuous rising of plastic demand led to the growing in waste accumulation every year (Sharuddin, 2016). A plastic is an organic hydrocarbon-based material, its high calorific value can be used for incineration or in other high temperature processes. But, burning of plastics releases a variety of poisonous chemicals into the air, including dioxins, one of the most toxic substances. Plastic waste can also be used to produce new plastic-based products after processing. However, it is not an economical process as the recycled plastic degrades in quality and necessitates new plastic to make the original product. Although these alternatives are feasible except for landfilling, recycling of plastic waste to produce new materials, such as 3D interior wall decoration or finishes, appears as one of the solutions for disposing plastic waste, due to its economic and ecological advantages (Nabajyoti Saikia, 2012).

## **2.0 LITERATURE REVIEW**

There are seven types of plastics according to the Plastic Container Code System which are polyethylene terephthalate (PET), The common plastic waste is Polyethylene terephthalate (PET), high-density polyethylene (HDPE), polyvinyl chloride (PVC), low-density polyethylene (LDPE), polypropylene (PP), polystyrene (PS) and other mixed plastics. Based on the study of literatures, pyrolysis process has the potential to convert the most energy from plastic waste to valuable liquid oil, gaseous and char. The pyrolysis could be done in both thermal and catalytic process provided lower operating temperature with greater yield of liquid oil for most plastics with the right catalyst selection. The method may decompose plastic into valuable energy fuel, the dependence on fossil fuel as non-renewable energy can be reduced and this solves the rise in energy demand (Sharuddin, 2016).

Next, the findings of an experimental investigation confirmed that Glass Reinforced Plastic (GRP) waste can be used as a partial replacement for virgin and raw materials in composites. The use of GGRP waste powder in concrete and rubber composites and GRP waste fiber in architectural cladding panels has technical, economic and environmental benefits. Furthermore, the addition of GRP waste powder and fiber to composites has the potential to improve the mechanical properties (Osmani, 2012).

A study indicated that plastic waste can be used as a partial replacement of natural aggregate. This is mainly due to the size and aggregate decreases the slump of fresh concrete mix while spherical shaped plastic aggregate increases it. The incorporation of plastic aggregate can reduce the density of resulting concrete and cement mortar and it provides lightweight concrete by using plastic aggregates. Therefore, concrete containing plastic aggregate will be more durable in the face of aggressive chemical attack (Nabajyoti Saikia, 2012).

Besides, other innovation is fresh properties of self-compacting concrete with plastic waste as a partial replacement of fine aggregate/sand. The usage of plastic waste in the concrete mixture increased the slump flow and V-funnel flow time. It indicated that the utilization of plastic waste in self-compacting concrete manufacturing resulted in systematical decreasing of the compressive strength (Sheelan M.Hama, 2017).

### **3.0 METHODOLOGY**

The collection of data is done by desk study. The study refers to available documents such as reports, journal articles, books, newspaper, etc. From journal articles, the data and information are based on the research of plastic waste issue and problems which may cause plastic pollution on earth which would harm any living creature. There are many innovations created from the plastic waste into new products in many industries as an alternative to reduce the plastic waste to the environment. The news keeps updated the current issues of plastic waste which shows many new cases and alternatives from time to time to realize the community on the initiative to raise awareness of plastic pollution and reduce the amount of single-use plastic littering the world's oceans. In Malaysia, a campaign of free-plastic bag which enforced in 2010, admitted that the campaign was implemented in order to reduce the use of plastic bags successfully fostering public awareness of the adverse environmental use of plastic. However, many things were discussed where everyone believe that they need to do their part to save the planet and have made many concerted efforts to go green.

### **4.0 ANALYSIS**

Market segment shares for plastics industry are presented in Table 1 which is based on data from Malaysian Plastics Manufacturers Association (MPMA). Plastics industry in Malaysia can be divided into seven (7) subsectors as follows (Bhd., 2011):

- a) Packaging – comprises plastic bags (packaging, shopping and garbage), containers, films, plates, sheets, foils, strip bottles and boxes. Packaging is the largest market for plastics industry;
- b) Electrical and electronics – includes electrical components/ parts and home appliances such as casings for television sets, radio, air-conditioning, telephone and accessories. This subsector is the second largest consumer of plastics in Malaysia;
- c) Household – includes plastic table ware, kitchen wares and toiletries products. Household is the third major sub-sector;
- d) Automotive – plastics are used for a wide range of automotive parts and component such as dashboard, bumpers and hood;
- e) Construction – plastics are used for manufacturing of pipes, valves and cable shield;
- f) Agriculture – comprises products such as planting bags, raffia string, rain shield, nursery tray and flowerpots; and
- g) Others – other sub-sectors include medical devices, plastic furniture, stationeries, toys and gifts.

Table 1: Major market segments for plastic products (2008-2010)

Sub-sector	Share (%)		
	2008	2009	2010
Packaging	40	42	42
Electrical & Electronics	23	25	26
Household	15	11	10
Automotive	9	10	11
Construction	7	7	7
Agriculture	3	3	2
Others	3	2	2

## 5.0 CONCLUSION

This review has provided concise summary of the issue and problem of plastic waste and discussion of the existing alternatives towards reducing plastic waste at the surrounding environment. With the pyrolysis method, the waste management becomes more efficient, less capacity of landfill needed, less pollution and cost effective. Various strategies are being devised to mitigate the impact of plastic waste. Many more alternatives should be concern and care about as an initiative to reduce plastic waste and the use of plastic itself in daily life that can be avoided in certain things. However, there is a need to identify and develop global environmental standards, as well as broadly applicable indicators, with which to benchmark these standards as a main gap in knowledge on plastic waste. Even though plastic recycling and its management has gained momentum nowadays, the best possible way of protecting the environment is to after the root cause of the problem by reducing the usage at preliminary level.

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