CHAPTER 1

BACKGROUND

1.1 INTRODUCTION

Oil palm product was the biggest industry in Malaysia. Malaysia currently reported a 39% of world palm oil production and 44% of world exports. For oils & fats, Malaysia has recorded to produced locally 12% and 27% of the world total production and export of oil and fats was reported by Malaysia Palm Oil Board (MPOB). Thus, making Malaysia one of the biggest producer and exporter of palm oil and palm oil product. However, the presence of these palm oil waster has created a major disposal problem. According to Economic & Industry deparment MPOB, (2014), in 2014 Malaysia had produced 19.9 million tonnes of palm oil based on 5.39 million hectares of land used for its plantation. Despite the obvious benefits, oil palm mill also significantly contributed to environmental degradation, both at the input and the output activities. On the output , manufacturing process generated large quantities of solid waste, wastewater and air pollution. Thus it is expected that million of waste tons of palm oil waste will be produced annually due to its productivity.

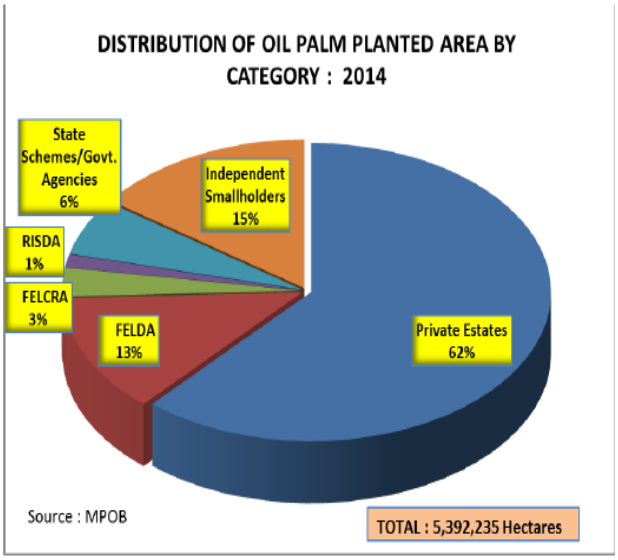

Figure 1 : Distribution of oil palm planted area in 2014.

(Source : MPOB, 2014)

Environmental issue has gained great attention in discussion among our society in recent years, the decision made in political, economic and social sectors are now seriously offering more attention to the environmental issues. With the increase in the development projects in Malaysia, the demand for the supply towards material such as cement and the aggregate iherently increases. This phenomenon inturn caused more natural resources to be extrected in order to produce such construction materials. Continuos proliferation in deforestation may lead to depletion of natural aggregate as well as ecological imbalance. There are some alternatives to reduce the usage of natural aggegate and created environmental friendly reinforced concrete beam. The present study to find out the behaviour of OPS and POFA in reinforced concrete beam from oil palm industry which is a waste in the production of concrete material.

1.2 PROBLEM STATEMENT

Concrete is among the most widely utilized material for building and construction material around the world. Nowadays, lightweight aggregate concrete has gain the development industry interest simply because of the benefits offered from this lightweight concrete in terms of decrease in member size, longer spans, improved fire resistance, smaller foundations and better thermal properties. However, producing this particular concrete requires usage of sand, cement and oil palm shell in higher amount compared to normal concrete. Success in reducing the amount of cement by replacing other waste material as partial cement replacement would produce a bit more environmental friendly construction material.

Oil palm product was the biggest production in Malaysia and it contribute to a major environment pollution. The types of waste from palm oil mill were, Empty Fruit Bunch (EFB), Oil Palm Shell (OPS), Oil Palm Fibre (OPF) and Palm Oil Fuel Ash (POFA). EFB can be used to generate energy and been banned in Malaysia because the process to produce energy can cause air pollution reported by N.Abdullah and F. Sulaiman (2013). After combustion for the production steam for palm oil mill the ash will be carried away by wind because the physical properties of ash is small particle and light. This situation will created a health hazard to local community which was lung disease. According to M.H Ahmad (2008), the demand for oil palm product increased every year

and the goverment of Malaysia, required the addition of landfill area to place waste from industrial and it cost a lot of money to spend on transporting the waste. For the coarse aggregate, due to higher demand in development for building the cost for coarse aggregate and cement became more expensive due to limitation of natural resources and the natural resources will decrease and depleted.

By using POFA and OPS from palm oil mill as a partial cement, coarse aggregate and sand replacement into concrete mix design was already carried out by the other researcher and found by using POFA and OPS can solved the problem. In this experiment, it is to determine the behaviour of OPS reinforced concrete beam partly replaced by POFA because this experiment have not been conducted by the other researcher.

1.3 OBJECTIVE

The objective of this experiment are:

I. To study potential of POFA as partially sand, cement, or aggregate replacement in OPS reinforced concrete beam.
II. To study the structural behaviour of OPS reinforced concrete beam when the material such as sand, cement and OPS is partially replaced with POFA.

1.4 SCOPE OF STUDY

1. The scope of the experiment was covered the application of the POFA as a partial replacement in material.
2. This experiment was carried out to determine the performance of OPS reinforced concrete beam with three type of mix design for reinforced concrete beam partial sand, cement and OPS with 20% replacement with POFA and 0% of POFA as a control design.
3. This experiment was focusing on structural behaviour on compressive strength, flexural strength, workability, cracking pattern and also mode of failure of OPS reinforced concrete beam partly replace by POFA.