CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Concrete is very important material and widely used in construction material since previous years until nowadays. Concrete is one of the oldest manufactured construction material used in construction of various structures around the world. Due to its high demand, the material used for concrete production depleting every year. Nowadays, demand for sand and gravel continues to increase in concrete production. Excessive sand mining will lead to the degradation of riverine environment. An indiscriminate and illegal sand mining has negative effect to environment setting and water quality of the river basin. The negative impact of excessive sand mining was elaborated by Asyraf et al., (2011). This issue has motivated researchers to investigate the potential of using waste materials as partial sand replacement material in concrete production. Success in integrating waste material as partial sand replacement in concrete would result in a more sustainable concrete product and cleaner environment.

Research towards the producing of new concrete materials can be divided into two factors presented by the two different industries in Malaysia that is by-product of palm oil industry and the rapid development of construction industry. The palm oil fuel ash (POFA) is generated from the burning of pressed fibre and shell at temperature of 800 – 1000 C to produce steam which is used in turbine for supplying the electrical energy to the whole mill for milling operation and domestic or estate use. Elaeis guineensis most famous by oil palm tree was first introduced to Malaysia as an ornamental plant in 1870. Since 1960, planted area had increase at rapid pace. It had increase for 4.3 million hectares in 2007. And it expand until 4.917 million hectares in 2011. Malaysia is now the second of largest producer of palm
on aiter Overtaken by Indonesia the first producer of palm oil in 2006. So, there are much of waste product produces every years that contribute to environment pollutant unless recycle it for other applications. According to (Abdul., 1997) it is estimated that million tons of its waste will be produced yearly and the Malaysian Government need to allocate more dump area for disposal in the form of land-fills. Innovation to the new products of freely waste material will convert this environmentally polluting by-product into beneficial material for the development of human civilization.

The incorporation of palm oil fuel ash (POFA) as a partial fine replacement is the better one because it give benefit to construction industry, palm oil industry and also for environment. The creation of new material is not expected to offer an extra incoming profit for palm oil industry and reducing ash ending at landfill but also able to contribute towards improvement of Malaysian construction technology.

1.2 PROBLEM STATEMENT

The rapid development of construction industry in Malaysia contribute to a variety of experimental a new technology in order to enhance the strength and durability of the concrete. At the same time, to produces a cheap and high quality of concrete in order to reduce the cost of construction Nowadays, demand in construction industry for concrete materials leading to increasing the use of local natural fine aggregate exploited fom the environment. It is possible if the conventional raw materialsuch as river sand use in concrete mix will run out. Excessive sand mining will lead to the degradation of riverine environment. An indiscriminate and illegal sand mining has negative effect to environment setting and water quality of the river basin.

Generally, the wastage of palm oil in industry for every years is increase gradually. Palm oil fuel ash which is unsuitable to be used as the fertilizer was dumped as waste behind the mill or landfill. Being ligth, this ash is easy to be blown by the wind and spread to other place thus causing air pollution. The air pollution may cause respiratory illness for the workers of the mill. The disposal of palm oil fuel ash causes negative effect on the health and comfort of the community. The other environmental problem is due to ground water source pollution (Tay and Show, 1997). So, in order to find a solution how to solve the wastage it is use for the concrete. It also contribute the side income for the palm oil industry. At the same
time, to focus to save environment because the wastage will give impact to the environment. To recycle the waste natural material by produces new product by develop the new technology.

1.3 OBJECTIVE

The objective of study are:

I) To investigate the effect of sieved POFA as partial sand replacement on workability.

II) To determine effect of sieved POFA content as partial sand replacement on compressive strength of concrete.

III) To determine the effect of sieved POFA content as partial sand replacement on water absorption of concrete.

1.4 SCOPE OF STUDY

The present research is an attempt to incorporate POFA as partial sand replacement in the production of normal concrete. Basically, the research is aimed to investigate the mechanical properties of concrete containing palm oil fuel ash as partial sand replacement. The quantity of POFA used is limited to 0%, 2%, 4%, 6%, 8% and 10%. All the specimens is subjected to air curing and water curing. Compressive strength test were conducted at the age of 7, 14 and 28 days. Water absorption test were conducted at 28 days.

1.5 SIGNIFICANCE OF STUDY

The outcome of study would provide information on the behaviour of normal concrete at different replacement level of POFA. At the same time, this study would encourage more studies to be conducted on the utilization of POFA in concrete production. This research also will help to reduce the use of river sand and minimizes the sand mining in Malaysia. Hence, it will lead to preservation and conservation of the environment.