CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Malaysian is one of the world’s largest palm oil exporter and palm oil production by 44% and 39% respectively. Malaysia produced about half of the world palm oil production (10.8 million tons), thus making Malaysia as the world’s largest producer and exporter of palm old ring this period (Abdullah & Sulaiman, 2013). In Malaysia, palm industry has grown rapidly. Many areas were opened up for oil palm plantation since 1920, during that time 400 hectares were planted and it expands up to 54000 hectares in 1960, the statistic is increased up to 5 million hectares in 2011. The oil palm growths is related to the world’s demand for oils and fats and directly make palm oil become the largest production and the first player in the oils and fats trade. This makes palm oil plantation need to be harvested more and more to ensure fulfill the world demand. Oil palm is the most important product from Malaysia that has helped to change the scenario of its agriculture and economy (Abdullah & Sulaiman, 2013). Malaysia produced 17.9 million tons of palm oil as well as 2.1 million tons of palm kernel in 2009, at the same time, quite a lot of waste biomass was generated, including 2.3 million tons of PKC (palm kernel cake), 30 million tons of EFB (empty fruit bunch) and waste fruit fiber and etc.

Due to increases of palm oil cultivation, there is an abundance of raw materials available on the palm consisting of around 90% of biomass wastes and only around 10% of the oil.
About 90 million tons of oil palm fruit production were recorded in 1998; however, 43-45% of this was mill residues in the form of EFB, shell, and fiber (Abdullah & Sulaiman, 2013).

According to the Waste Management World (2012), waste, including POME, from the region’s 1000 plus Palm Oil plantations is a significant issue for plantation owners, local communities and the region in general and contributes significantly to total emissions. This statement also is supported by Zafar (2015), from the palm oil waste, almost 70% of the volume from the processing of fresh fruit bunch is removed as waste as empty fruit bunch (EFB), fibers and shells.

![Figure 1.1: The statistical of oil and fats export (1990-2015F)](image)

Source: MPOC

Figure 1.1 shows the palm oil is the highest exporter with 36.22% and 58.08% since 1990 and 2015.

Concrete is known as a composite material of sand, aggregates, cement and with the perfect amount of water. Concrete has its own characteristic that makes it is becoming popular in the construction industry in the world beside the steel and timber, concrete has high compressive strength, but lower in tensile strength. For conventional concrete also has its own specialty like good in thermal conductivity and sound insulation properties, good fire rating, non – combustible and ease of handling. Besides
that, concrete also has been invented by several researchers to produce concrete by using the waste material. Likes empty fruit bunch (EFB) fiber have been used in previous researchers into the concrete mixture to produce the concrete to improve certain aspects of concrete.

In this research, the empty fruit bunch (EFB) fiber used in concrete mixed as an additive. By using this empty fruit bunch (EFB) fiber into the concrete mixture will become a renewable of empty fruit bunch (EFB) fiber usage into the valuable and useful product where it can help to control the pollution and environmental sustainability.

![Figure 1.2: Empty fruit bunch (EFB)](image)  

**1.2 PROBLEM STATEMENT**

In Malaysia, with an annual growth of 5.9%, areas under oil palm increased from 641,791 hectares in 1975 to 5.0 million hectares in 2011. By 2012, oil palm plantations occupied 15.4% or 5.08 million of Malaysia’s land mass (Adnan & Kum, 2015). Empty fruit bunch (EFB) is produced after the fresh fruit bunch is a process to produced oil mill, the EFB will be sent back to the field for disposal and may be to be used for mulching. Due to the abundance of empty fruit bunch waste that was produced by the palm oil cultivation, it also generates to the other problem that related to waste management. According to Lim, (2010), replacement of fossil fuel for industrial use and consequently address the issue of waste management since the density of EFB