CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

Throughout the world, concrete is being widely used for the construction of most of the buildings, bridges and others. Hence, it has been properly labeled as the backbone to the infrastructure development of a nation. Nowadays, the construction industries are searching for alternative products that can reduce the construction cost. Various types of waste material with processing and treatment might be replaced as a potential building material and to be used in many types of construction project. However, not all the waste material can be reuse as building materials even to process it as well. Thus, researches and experiment to evaluate the effective and potential of waste reuse for construction industry is required. The usage of waste product such as eggshell powder as cement replacement to produce a new upgraded brick are seen to be the most effective way to maximize the profit while reducing the amount of waste.

Eggshells are known to have good strength characteristics when mixed with concrete. Calcium rich eggshell is a poultry waste with chemical composition nearly same with the limestone (Amu et al., 2005). Besides, its chemical composition almost similar to that of ordinary Portland cements (Uma Shankar & Balaji, 2014). However, as limestone is a natural mineral resource, quarrying and further uses of limestone may lead to problems related to environment. A part from that, lime production involves energy intensive process and consumes water. Therefore, identifying analogous material from waste and using the same in concrete production could be wise idea. Use of eggshell waste instead of
natural lime to replace cement in concrete brick can have benefits such as reducing the use of cement. The use of eggshell powder in concrete production reduced the cost of raw material and contributes to the construction industry. Thus, eggshells can be applicable to reduced cost of construction material and produced a new raw material for development in the construction industry.

Several researches and studies about the eggshell have been made to know it characteristic. Based on Okonkwo et al. (2012) eggshell established to be a good accelerator for cement-bound materials and considerable reduction in alkali-silica and sulfate expansions Dinesh et al. (2014). Research show that eggshell has a cellulosic structure and contain amino acids, thus is expected to be a good bio-sorbent or in other word bio sorption. It is a metabolically passive process which it does not require energy that bind contaminants onto its cellular structure and concentrate adsorbents from aqueous solutions resulting in a reduction of sorbet concentration in the solution. So it’s have excellent durability as well as save money as less material required.

Recently, the brick is mainly from clay or concrete and the clay is the most common material used in the production of brick. Since the material is nonrenewable source and may deplete on the coming years and it’s seen like non economical to produce due cost of brick which produced with the above material increased continuously. Furthermore, the clay brick has come under a different kind of fire due to its environmental impact. The firing process in the manufacture of clay bricks has raised some sustainability concerns because of the energy consumption and greenhouse gas (GHG) emission such carbon dioxide (CO2) and it is considers accelerating climate change. Thus, there have to consider incorporated recycle content into the conventional bricks (Chusid, et al., 2009). Therefore, identifying analogous material from waste and using the same in concrete production could be wise idea.
1.2 PROBLEM STATEMENT

Eggshell is classified as a waste material by the food industry but is in fact a highly sophisticated composite. However, majority of eggshell waste is deposited as landfills. It is observed that Malaysia consumed the highest chicken and egg consumption among the Asian countries. High consumption of eggs has generated large amount of eggshells to be disposed. The usage of food waste such as eggshells in Malaysia is very limited compared to the European countries (Maybank IB research, 2011). Its increasing with high demand due to food plants constantly accumulating substantial quantities of eggshell. As a consequence, huge problem of pollution is generated as well as it can attract rats and worms due the organic protein matrix, resulting in a problem of public health (Jayasankar et. al, 2010).

There are several types of waste disposal system. The common waste disposal systems used in Malaysia are open burning, ocean dumping, composting, incineration and land filling. Almost all the waste in Malaysia are dispose using landfill method and majority of the sites are poorly managed. Due to the large amount of waste production, the number of landfiling sites has increased and the number of landfiling sites is expected to increase as result to growth in population, economy and agriculture (Zaini, 2011). A part from that based on his research, dumping site in Malaysia has increased in alarming rate. So identifying material from waste and using in concrete production could be some wise idea as Portland cement costly, energy intensive and produces large amounts of carbon emissions (P. Vipul Naidu & Pawan Kumar Pandey, 2014).

Therefore, research study about use of a waste material as a replacement to cement and aggregates is necessary to conduct as recycling eggshells into the useful product gives good potential benefit on many levels, both for food manufacturers and a much wider construction industry. This research will focus on the utilization of eggshell powder in the brick production due to the brick as a main building material.