CHAPTER I
INTRODUCTION

Over the years, plastics have undergone a spectacular evolution in development and use. Plastics are now used in countless applications, from cars to packaging, from medical equipments to mobile phones and buildings. The packaging sectors remain the largest consumer of plastics. Plastics continue to be the material of choice for packaging, increasingly substituting other materials because they are lightweight, flexible, and easy to process. Not only plastics have several good mechanical properties, but they can be compounded with other materials to make new kind of plastic.

At present, the world plastic market is in a highly competitive situation. The innovative technologies have been feeding to global plastic industry. The development of industrial technology has deteriorated the environment tremendously. Deformation of nature and environmental impacts such as air, water, land pollution and depletion of resources are the examples of environmental problems. Manufacturers have been forced to be more concerned about the environmental issue than before. Sustainable development has been introduced as the only possible and acceptable development if human civilization is to avoid collapse in the near future. Environmental sustainability is about making products that serve useful market and societal functions with less environmental impact than currently available alternatives. Moreover, environmental sustainability necessarily implies a commitment to continuous improvement of the products throughout their entire life cycle. Recently, the concerns over the environmental impacts have spreaded to plastic industry. Due to high demand in using plastics, the environmental impacts can occur in all steps including production, use, and disposal. In the future, green products or the environmentally friendly products from plastics will be an important motivation to the development of bio-based polymers. To make obviousness that they become more friendly products, there is a need to evaluate the environmental impact of biodegradable and conventional plastics by using life cycle assessment (LCA).

Life Cycle Assessment (LCA) is a tool for the systematic evaluation of the environmental aspects of a product or service system through all stages of its life cycle that called "cradle-to-grave". LCA provides an adequate instrument for environmental decision support. Life cycle assessment has proven to be a valuable tool to document the environmental considerations that need to be part of decision-making towards sustainability. A reliable LCA performance is crucial to achieve a life-cycle economy. The International Organization for Standardization (ISO), a world-wide federation of national standards bodies, has standardized this framework within the ISO 14040 series on LCA. The LCA tool is used for finding the hot spots in the life cycle of the product or process in order to be able to make the best decisions on minimizing the environmental burdens of the product, process or service. It is also used for comparison between different products regarding the environmental impacts. At present, LCA is widely used by many industries to enhance the environmental performance of their products. Many industrial sectors have already used LCA for their environmental assessment such as computer parts sector, electrical appliances sector, automotive sector, packaging sector and textile sector.

This research will focus on identifying, quantifying and assessing the environmental impact of biodegradable and conventional plastic bag production in the packaging sector by using life cycle assessment approach. Specifically, polyethylene plastic bag production is assessed by using SimaPro 5.1 LCA software, which is a well-known and widely used program in this field. The scope of the study includes raw materiai, production process, and disposal during polymer production, energy and materials used in each process, transportation step and recycling process. Ultimately, the "gate-to-gate" life cycle assessment of the plastic shopping bag will be established.