CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

Life cycle assessment (LCA) was used to evaluate, quantify, and compare environmental performance associated with the manufacturing of three types of shopping bag, which were conventional PE, PE-photo additive, PE-starch, in Thailand. Simapro 5.1 software was used to analyze the environmental impact of the three products and identify the hot spot for one kilogram of each type of bag that defined as functional unit in the goal and scope part of the study.

The results obtained from the impact assessment by Eco-indicator 95 and 99 methods showed that the hot spot of all three types of shopping bag was raw material input phase. From the final weight score of Eco-indicator 99 method, the largest environmental effect in the production of shopping bag, shared 85 percent of all effects, was due to resources usage. The main source was the HDPE pellet that used as raw material. Damage assessment also showed that the damage was mainly on resource depletion and human health which result from impact categories such as depletion of fossil fuels category (resource depletion) and respiration of inorganic substances which had direct effect on human health. Assessing LCA throughout 6 phases of plastic bag production by Eco-indicator 95, the results indicated that raw material input was still remained the hot spot of the life cycle of shopping bag production and recycling phase was second highest contribution to environmental impacts. The reason was due to the largest contribution to the greenhouse effect, acidification and eutrophication potential. For raw material input phase, the environmental impacts mainly came from use of HDPE which was main raw material of shopping bag production. The environmental impact in recycling phase was mainly came from water and electricity use in this process.

PE-starch and PE-photo additive bag generated approximately 5.33 percent and 3.11 percent less environmental burden than conventional PE bag. This was due to lower HDPE being used per functional unit. The use of starch or photo additive to replace HDPE had a little effect on the environmental performance of PE-starch and PE-photo additive bag production.

Suggestion for improving the environmental impact from the production of these plastic products should be emphasized on the raw materials used in the production process. Replacement of high density polyethylene (HDPE) by photo additive (calcium oxide) or starch can reduce environmental impact. For recycling process, the problem was mainly from the energy and water consumption. This problem may be improved by applying cleaner technology or other appropriate energy conservation technologies to the manufacturing process of these plastic products.