5.1 Summary and Conclusions

In this study, the critical decision criteria, sub-criteria and benefits of the ISO 14001 based environmental management system (EMS) were studied, and an AHP decision model of EMS adoption was established to obtain the priority weights for each of these criteria.

A fundamental problem of decision theory is how to derive weights for a set of activities according to importance. Importance is usually judged by several criteria that may be shared by some or all of the activities. This weighting of activities with respect to importance is a process of multiple-criterion decision making in a hierarchical structure.

The AHP is a measurement theory with practical methodology to facilitate a variety of decision-making, each can be as a stand-alone problem or a part of an integrated strategic thinking process. Through a systematic elicitation of perceptions and judgements from well-informed and knowledgeable individuals, the underlying priorities of a complex situation can be captured rather accurately. Its use in this study, and the results obtained demonstrate the potential of the proposed model in supporting the decision making process in the adoption of the system.

By consolidating and analysing the judgements obtained from the six pre-selected evaluators who have extensive experience and expertise in the implementation of the EMS, the critical decision criteria and sub-criteria contributing to the successful adoption and implementation of the ISO 14001 EMS was identified. The assessment was carried out at four levels and the computation of the judgements which involved the consolidation of pairwise judgement matrices was carried out using a decision support tool, Expert Choice™.
Based on the findings of Level 1 of the study, the decision criteria which was observed to be more important (with higher priorities) were Company Image and Market Trend. On the other hand, the decision criterion which received the lowest weight was Environmental Conservation.

For the Level 2 assessment which involved ranking the various sub-criteria under each of the decision criteria, the following conclusions were obtained. (The judgements of Group 1 and Group 2 were averaged to obtain the priority ranking under each decision criteria).

- Under the decision criteria of Operating Costs, the highest ranks were given to Process Cost and Material Costs, followed by Labour Costs. Least importance was placed on Overhead Costs and Other Associated Costs.

- A review of Product Quality sub-decision criteria indicated that all three sub-criteria – Product Quality, Service Quality and Social Responsibilities were ranked highly.

- Assessment of the Market Trend decision criteria indicated the Government Policies was ranked the highest. The remaining three sub-criteria were ranked almost similarly – they are Market Pressure, Customer Requirements and Investors’ Interest.

- For the Level 2 assessment of Company Performance, high weights were given to Emergency Preparedness, followed closely by Operational Effectiveness and subsequently Sales Turnover. Lower ratings were given to Customer Satisfaction and Employee Commitment.

- Under Environmental Conservation, the sub-decision criteria which topped the ranks were Waste Minimisation, Waste Recycle, Energy Conservation and Green Technologies. Waste Treatment was the most unpopular.
In the Level 3, assessment, importance to the four benefits were placed in the following order:

1. Improved Profitability and Performance
2. Enhance Company Image and Reputation
3. Strengthen Customer Loyalty and Trust
4. Stimulate Staff Morale and Commitment

Overall, under the Level 4 assessment, the judgements of the evaluators in Groups 1 and 2 indicated that all of them believed the ISO 14001-based EMS was successfully implemented in the oil and gas industry in Malaysia.

The findings of this study concur with previous studies and investigations involving EMS implementation in the industrial sector.

5.2 Recommendation for Future Research

Based on the study conducted and the proposed decision model, evaluators or managers responsible for the management of environmental systems within the organisation can use the AHP method as a practical management guide to determine the priorities among the decision criteria and sub-criteria and use this information for the effectiveness adoption and implementation of the ISO 14001 based EMS.

Although this study presents findings derived from experts in the oil and gas industry in Malaysia, the decision model can be tailored to suit any other organisation. The collated findings of this empirical study can also be contrasted against other business circumstances and be used to address other business constraints and deficiencies.

It is also recommended that the current study can be extended to carry out a cost/benefit analysis of the implementation process to make the decision as to
whether an organisation should proceed with the certification based on its economic feasibility.

The number of evaluators may be increased to examine the effects of changing the relative priorities of decision criteria, although the number of inconsistencies is expected to increase. It is recommended that when increasing the numbers, small incremental changes are made to prevent any distortions.

Another recommendation is to ensure that experts from the government and non-governmental agencies responsible for environmental management be included in the panel of evaluators, as their perspective would be more global.

Since the size of the oil and gas companies are varied, it is recommended that further investigations be carried out to validate the decision criteria and benefits identified obtained in this study. This will provide more insight as to weather the employment of the AHP model will contribute to improving and sustaining the enterprise competitiveness.