CHAPTER V
CONCLUSIONS AND RECOMMENDATION

5.1 Conclusions

In this thesis, the optimization model for refinery planning with integrated pricing decisions was introduced. The decision of crude oil purchasing was performed with the consideration of the unit and process constraints in the refinery. Furthermore, the decision was aimed to reach the product demands and specifications. All property calculations used here were blended linearly. First the planning model was developed using a deterministic approach. Then the relationship between product prices and demand was modeled using the microeconomic concept of the "utility function". The price-demand model was integrated into a developed model to simultaneously determine the prices and the optimal schedule. After that the model was adjusted by applying the stochastic technique to consider the uncertainty among the total demand of product and consumer budget.

The models were tested on the simplified process of the Bangchak Petroleum Public Company Limited. Optimization results from the planning model without pricing were different from those of the pricing one. This is because the price and demand of the planning model without pricing were generated randomly and independently instead of predicted from the price-demand relation as in the planning model with pricing. Actually, the product demand and price should have some relations between each other.

The deterministic model results are also compared with the stochastic ones. The results show that when the uncertainty was considered, the risk curves of the deterministic solutions provided a lower expected GRM and higher risk than those of the stochastic solutions. Some concepts of the financial risk management were presented including the upper bound risk curve, the Opportunity Value (OV), the Value at Risk (VaR) to compare the best stochastic result with the other alternative solutions.

All planning results showed that the OM, SLEB and PHET crude were the first choice in purchasing. This was due to their high margin because of lower cost.

5.2 Recommendations

This thesis can be further developed since more issues remain to be investigated. The following recommendations would be useful for the future work.

In order to make the model more accurate,

1. The production yields should be adjusted so that they are close to the actual production from each processing unit especially for the crude distillation and reformer unit.

2. The inventory of crude oil and intermediate storage tanks can be added to the model.

3. In the objective function, the operating cost of each unit can be taken into account.

In addition, the cost information is obtained from historical data that have high degree of fluctuation. In these historical data, there are unidentified factors that could have affected the fluctuation in GRM such as the relationship between crude oil cost and product price and the political policy.