CHAPTER 5
Conclusion and Future work

5.1 Conclusion

To conclude, the composition of all attributes of the Electricity System Industry (ESI), not only resource allocation and planning generation efficiency and scheduling but also tests on transmission and distribution stability up to the demand side management and promotion, and the description of energy economic, are all difficult to understand for general users. Formerly, this research has analysed the entire range of attributes and identified the task templates and communication models in order to map the information transfer between the ESI agents. Moreover, this research also analysed the relationship of the ESI attributes with the external factors that affect the operation of the electricity system industry (ESI). Finally, the uniqueness of this research lies in the ability to set up the attributes of the ESI and identify their relationships by using the Balance Scorecard methodology, then applying it to every type of electricity market competition, which may cause anxiety towards each attribute in varying degrees.

- To develop online economic modelling framework for ERC to use in its decision making activities.
    - To discover the method for manage incomplete information.

      In this thesis, the meaning of energy economics was defined and classified in order to specify the task scope of the Electricity System Industry (ESI) and the architecture of the Electricity System Industry (ESI) was separated into its attribute for many sectors, presented in chapter 4 by using the popular methodology, the Balance Scorecard (BSC). This thesis also analysed the competition in the electricity market based on study of the global theory of market competition, which defines the relationship of market supply and demand in general. Then this thesis identified the characteristics and problems of each electricity market, from monopoly to the fully competitive type. After

that the issues in each type of the electricity market competition were classified and applied to the global strategic map, which is concerned with the ratio that each market type gives for every attribute that may not be equal when compared with the other competition type.

In order to use BSCs, the task of the ESI has been separated into four sectors that relate to finance, customers, internal business processes and learning and growth for generating the global strategic map, which can be used for the Electricity System Industry (ESI) in any region. Then the tasks in the strategic map were identified and the relationship between the tasks was shown. After that, this thesis described this task by using the OMTI form, which shows the task theme, task objective and its indicators. Then, the CommonKADs methodology has use to identify relationship between task and player by use task template and communication plan to design task and information flow of every attribute, and describe the detail on CM1 and CM2 form.

- To prove that information which provide by knowledge database can replace in blank information from report.

Up to the beginning of chapter 3, this thesis focused on identifying the tasks and information transfers between all agents in those tasks by using a knowledge creation tool known as the commonKADS model. In order to apply commonKADS to classify the electricity industry tasks, it was first needed to identify the pattern of task templates for every task and the agents involved in that task. The results of this research show that every task in the electricity system industry is related to other tasks and its structure for generating, monitoring, scheduling, assessing and planning, of every part, are similar with that of other tasks. Therefore, this thesis presents the characteristic of the task template from fuel purchase for generation, which has the task of monitoring resource usage ratios, predicting the reserve capacity and bidding process, to generating the purchase

licenses to generators, transmission, and distribution and demand side management. It was seen that almost all had the same task pattern.

On the other side of the commonKADS methodology, the communication plans of each task are also presented in this thesis. That plan presents the transaction information in computerized patterns that everyone can understand and correspondingly describes the detail of the transaction, which includes the transaction names, agents involved and the valuable information that is transferred during each transaction. Moreover, this model also identified the role of information and separated the information of the transactions into core information and support information. The valuation of information was presented in the form of a string, text or chart. Consequently, this research used that information for a transfer model, CM1 and CM2, making a common information model (CIM) by designing the communication patterns and showing the information transactions from fuel purchase to demand side management. The CIM described the characteristics of information transfer by using a Unified Multiple Language (UML), which was presented in the form of an information workflow that identified the indicators of each task. The result from chapter 3 show that communication plan can support any player to identify the information the position of information on each task then they can find lost information and fill any blank information in their database.

To suggest that the risk in decision-making can reduce by manage incomplete information, and prove that managing incomplete information can improve the ability of committee to make better decision.

After validate the attribute on chapter 3, this thesis also validate the result by apply to improve the procedure of energy emergency plan. The result show in chapter 4 that the flow of emergency procedure has minimize and player has identified, then the time for information request on each stakeholder was reduce because of clearly identify the responsible of stakeholder. After that the demand response task was

verify because it never have any procedure before, and it prove in chapter 4 that methodology result can identify the procedure of demand response which show detail of each procedure and information of stakeholder in each procedure. Finally, the result show that demand response procedure can create by use this thesis methodology and also can clearly define the relate stakeholder and information of this plan.

- After that, the researcher set down the scope of this research to cover the effect of the decision on groups of people and the research will be limited only to the method to manage both structured and unstructured information, and will not go into the process of using that information to help the committee in making decisions.

By create Energy Management System by create whole industry balance scorecard and resent attribute information by use task template and communication plan model. Then the result of this thesis has validate by apply to the case of improve emergency plan procedure and it found that the time of some procedure has reduce based on clearly of stakeholder and information on every procedure. Following by validation on demand response task which never show the procedure before, and it can prove that this method can support the procedure creation but it just only use that procedure to support the decision of committee to make the better future strategic plan.

5.2 Future Work

The intention of this thesis is to generate a common information model of the global electricity system industry (ESI) by using a common information model (CIM) in the form of Unified Multiple Language (UML), which the people can easily understand and use to acquire the whole picture of the ESI. Moreover, any future development of this thesis will use the thesis's content as the starting pattern to develop the Energy Management System (EMS) of any ESI in the different regions, in order to see the limitations of this framework.