Chapter 7
Conclusion and Future Works

7.1 Conclusion

Electrical utilities in the future need some decision support tools for their operation according to energy regulation and evolution. In Thailand, smart energy vision is promoted and distribution utility like Metropolitan Electricity Authority (MEA) has to concern about their distribution system and operation. Distribution Managent System (DMS) is one solution which recently having an implementation contract. Although they have their knowledge and requirement on the primary distribution system, DMS is IT-based technology which required very special expert. So MEA has had Utility Consulting International (UCI) as their consult for specifying the first required DMS phase.

According to environmental consideration, such as global warming, every utility and manufacturer around the world has to concern about the carbon dioxide emission which is coming from an inefficient energy generation, transmission and distribution system. ‘Smart Grid’ concept has gotten more attention around the world which considers both primary system and IT infrastructure because the grid can be isolate to ‘Microgrid’ and the ‘customer’ sometimes becomes ‘producer’. The grid and infrastructure, from source the beginning producer to the end consumer, shoud be more intelligent and need more automation prepareness in order to achieve this system requirement in the future. ‘SCADA application, DMS’, is necessary for distribution utility like MEA. Its functions like the cockpit for system operators and have several decision support application software to ensure the smart distribution system in the future envirorment. However, the life cycle assessment of DMS should be achieved with appropriate planning. The specific domain knowledge on this system is considerably essential.

7.1.1 Better Project Management

Knowledge can be categorized into ‘Tacit’, which is very powerful but is deep inside human recognition, and ‘Explicit’, which is logical in human brain and easier to captured and shared for the organization. This knowledge can be manipulated by the concept like ‘Community of Practice’, ‘System Thinking’, ‘SECI model’, and ‘Ba’ environment. Moreover, knowledge engineering methodology provide the tool like ‘CommonKADS’ which is appropriated to this research compared to the others.

This research methodology provides three model levels which are; context, concept, and artifact, to create the IT-based Knowledge Management System for the specified task. However, many key actors of this system are necessary required especially knowledge provider, knowledge engineer and system developer.

DMS standard design methodology by consult was mention. It was remarkable and helpful for utility to get the specific DMS. The propose methodology used ‘CommonKADS’ to help utility capture and model some useful knowledge with consultant and supplier in the reciprocal way for better project implementation in the future.

This research also shows that the practical DMS design knowledge from consult can be modeled. Knowledge engineering, CommonKADS ‘Propose and Revise’ template, can be a potential tool to capture information and structure this practical DMS design knowledge. By communication model from knowledge engineering, the procedure and worksheet can be dynamically facilitated to understand each other, reduce conflict, put into teamwork, and share useful information. Everybody is able to corporate and nobody go beyond their responsibility. The DMS project management which considered difficult and required an expert service because of the project size and complexity, the evaluation on function and performance, and the reason for system deviation, can be improved by the IT-based knowledge management system that is a mutual trust ‘ba’ environment of the design team from each party. Better DMS project management can then be succeeded in short term.

7.1.2 Enhanced DMS Capability in Long Term

The knowledge management methodology applied in DMS design problem is considered new and successful. Moreover, there will be enhanced organization DMS knowledge in long term. In conclusion, operating tool like DMS is important for power distribution utility in the changing environment. The system is very technology intensive so that it is difficult for utility to design it themselves. The typical solution for DMS project is to ask for a technical assistant which can help utility to manage the project from the beginning. This package solution is very comfortable. The general design process from consult is practical for utility; despite the fact that, the utility staff has no real practical knowledge on this system and it is still difficult to maintain and modify the system without any further assistance. Because utility holds their distribution system knowledge and operation requirement, knowledge management and knowledge engineering can provide the methodology that begin to keep this practical design knowledge within the company and work together with consult and supplier. Then they will not be only depending on an assistance service.

Similar approach could also be applied generally to other computer system design such as SCADA/EMS and substation automation which an engineering design process is nearly the same only the degree of data model and the extent of data population is different. In standard many application interfaces tend to use a common Enterprize Application Interface (EAI) to harmonize and obtain more value added data for each application. Especially in DMS application likes Fault Location, Isolation, and Service Restoration (FLISR) can also be enhanced by interfacing to other application in the design process.

7.2 Future Works

By the result of the case study in this research, it is believed that practical knowledge could be structured by knowledge engineering methodology; however, the propose IT-based knowledge management system in the fourth case is not implemented in this first DMS design stage. It is strongly recommended for the future work that the IT-based knowledge management system should be implemented and

the DMS knowledge quality should be measured in each project cycle in order to keep and reuse the real, updated, and practical knowledge.

The IT-based knowledge management system must be managed in spiral way. By accessing the life cycle for software engineering, the aim is to achieve progress by means of subsequence cycles that may be adapted on the basis experience from previous cycle. By this way, the context, concept, and design model aim to balance between structure control and flexibility by review process, identify risk, plan the cycle task, and monitor results in each cycle. It should be repeated and revised in the different steps. For example, the objective and criteria should be set in each cycle. The risk should be assessed and monitored.

Moreover, the quality of DMS design knowledge and It-based KMS should be measured in each cycle in order to adapt the IT-base KMS. The quality attributes relevant to knowledge system project presented in table 7.1 should be measured.

Table 7.1: Quality Feature

Features	Measurement
Knowledge capture	Adequacy Structureness Validity Coverage Testability
Knowledge reusalbility	Effectiveness Completeness Reliability Certainly Accessability Transferability
Functionality	Suitability Interoperability Accuracy Security
Reliability	Maturity Fault tolerance Recoverability
Usability	Understandability Learnability Operability
Efficiency	Time behavior Resource behavior

Table 7.1: Quality Feature (Cont.)

Features	Measurement
Maintainability	Analyzability Changeability Stability Testability
Portability	Adaptability Installability Conformance Replaceability