Chapter-6

CONCLUSION AND FUTURE WORK

This chapter provides brief conclusion regarding the completion of the current research work. Core feature of the completed work is reiterated. Recommendations regarding future work are also outlined.

6.1 Conclusion

One of the core aspects of this research is combining the benefits and versatility of Artificial Neural Network and MS Excel while attempting to *develop a process model for DDP* that may be used at oilfield plant *to* ***simulate*** *various operating scenarios in order to support decisions for* ***optimizing plant's operation***, and thereby, to attain a versatile process model, that is, a model-based decision support tool in Excel that may serve variety of purposes by virtue of its being a Neural Network in MS Excel, as has been explained elsewhere in this thesis. It is demonstrated that such modelling tool / framework (named VP Model) has been achieved, in its basic form. Such modelling framework was used to demonstrate two process modelling applications for DDP and results were found encouraging. Particularly, results of the models developed in MS Excel and trained through Solver (incorporating GRG2 code) in MS Excel were found comparable to the results of ANN models previously implemented through the reputed MATLAB software and trained through LM algorithm. VP Model may be linked with Aspen Hysys, which does not have direct provision for modelling DDP to predict its performance.

VP Model developed in this research may be populated, trained, and continually updated for various operating parameters of interest for different DDPs irrespective of their different

design / construction, for using it as a model-based decision support tool for optimizing plant's operation.

6.2 Recommendations for Future work

In view of its novelty, and encouraging results, the present work creates a wide variety of scope for future research, and some of them are listed below:

1. Deployment of the model at real DDPs, for model-based decision support, specially to reduce wash water needs which is very precious for lives at desert locations and to reduce chemical consumption which costs a lot to the oil company and adversely affects the environment. Real plant data was already used in this research, for academic interest, in primitive ways. However, achieving actual deployment of the model at a real plant, involves many technical as well as administrative issues, and requires appropriate resources. Especially, following needs to be addressed:
   A. Compiling good quality sufficient data covering entire range of operation of DDP
   B. Customizing the model to incorporate ANN's appropriate topology taking into account the optimization scenario, number of process variables of interest for the operating company, and the available data.
   C. Adding features and safeguards, needed for convenient fool-proof application for regular usage.
2. Utilizing the model for accomplishing model-based decision support for variety of applications beyond modelling of DDP:
   A. It may be utilized by process engineers at any process plants to suggest plant's operation, in optimized manner, by predicting plant's performance under different operating scenarios.

B. It may be coupled with various advanced Asset Models / DSS being developed, to enhance their applicability in view of its versatility.

C. It may be used in place of advanced softwares for regular deployment in order to avail numerous benefits like to save expenditures on computation power (e.g. usage license) and time (taken by advanced software to access license each time it is opened and to converge each time any parameters are varied) and prevent wastage of resources (in view of reluctance in using rigorous process simulation tools by operations staff). Advanced softwares may be used to determine optimal ANN configuration and to generate accurate and sufficient data for the desired operational range to train such model only during deployment and updation exercise.

D. It may be used, especially, for process modelling for real-time optimization, in view of its time-saving and friendly features.

3. Application of the model to derive useful knowledge from large data available at operating plant (e.g. as plant historian): For example, the model can be linked with Hysys model and also with plant's DCS to import plant data and to study plant's behaviour.
4. Applying the model as a convenient 'operations research tool' for variety of problems, and demonstrating through examples the benefit of ANN thus implemented in Excel.
5. Current work focussed in attaining the model in Excel without using macros and VB programming, purposefully, as explained elsewhere in this thesis. However, to add automation for achieving convenience for customization, particularly for changing ANN configuration, macros and VB programing may be used. Also, many features would be needed to be incorporated to be used it as a full-fledge modelling tool for several applications. Such work was not the purpose of the research. However, future work may be done to attain those features.