General Conclusion

This thesis presents a systematic study of bi-cooperative games with fuzzy bi-coalitions, bi-cooperative games with fuzzy bi-coalitions and fuzzy characteristic functions, the Banzhaf power index for fuzzy bi-cooperative games with fuzzy bi-coalitions, on risk involved fuzzy cooperative games and some of their properties. The importance of fuzzy integrals toward applications is hidden in their extension of bi-cooperative games and its Shapley value by allowing bi-coalitions to become fuzzy. We have defined here only two classes of fuzzy bi-cooperative games namely games with proportional values and in Choquet integral form. Between these two classes the former is seen to be unnatural in the sense that the members of this class need not be continuous as well as monotone in fuzzy sense. We therefore abandoned this class for further study and rather switched to another class. Thereafter, it has been shown that the members of this later class satisfy both continuity and monotonicity. A solution concept namely the Shapley function to this class has been proposed. As this study of ours is first of its kind, we have introduced the notions of only these two classes derived from their historically significant counterparts, whereas there may exist some fuzzy bi-coalitions whose payoff cannot be expressed by crisp bi-coalitional values and participation levels. Apart from presenting most of the results of bi-cooperative games in a fuzzy environment, we have studied some aspects of a risk involved fuzzy cooperative game and discuss the related properties. We have adopted the construction of level set in fuzzy environment and application of the investigated models to real life situations for our project. For the purpose of bridging the results to a real world problem, we have given some concrete examples. The study is expected to generate and add new knowledge regarding the
notion of bi-cooperative games with fuzzy bi-coalitions and a risk involved fuzzy cooperative game and the ways and means to meet them in a practical way. We hope that our contribution will enrich the field of fuzzy game theory. We plan to introduce and examine more such games in our future studies.