## Abstract:

Flood is known as the most common natural destructive phenomenon, which can cause severe physical, social and economic damages and losses in regions. The management of flood risk involves a better understanding of vulnerability, as hazards only become disasters if they impact a system that is vulnerable to their effects. A methodology presented in this thesis is capable of flood risk management by: a) Non structural flood vulnerability assessment and b) a theoretical structural flood control model. In the recent past, vulnerability of floods has been assessed using vulnerability measurement consisting of components from various elements of flood damages, especially environmental, social and economic factors. In this thesis we present a multi criteria decision making (MCDM) technique based on fuzzy set theory and VIKOR method to assess the flood vulnerability. Trapezoidal fuzzy number and its arithmetic operation, linguistic variables are used to assess the rating of the weights for the established criteria. The Ordered Weighted Averaging (OWA) operator is utilized to aggregate individual opinions of the experts into group assessment. The computational procedure of the proposed framework is used to analyze flood vulnerability region in BTAD region.

In the flood management  we presents a fuzzy multi criteria analysis approach model for selecting flood control structural project alternatives which takes economics, social and environment into account. The multi criteria nature and the presence of both qualitative and quantitative factors make it considerably more complex. This model tries to solve flood control project problem in fuzzy environment where both criteria and weights could be in fuzzy sets and expert's opinion and judgment are taken into consideration the entire modeling process.  The Fuzzy Analytic Hierarchy Process (FAHP) method is used to determine the weights of the criteria. After that, fuzzy VIKOR is proposed to rank the alternatives. The outcome of this research is ranking and selecting best alternatives with the help of fuzzy VIKOR.

Towards  the end  this research presents the development and comparison of multiple MCDM technique such as  Fuzzy PROMETHEE, Fuzzy VIKOR and Fuzzy

TOPSIS to as-certain an accurateness of the method in the selection of best flood control alternatives.

The outcomes of this Ph.D. thesis may give the administration, engineers, analysts, decision makers, and local authorities with a progressively suitable and invaluable guidance and outline for controlling the river basin on flooding, which is useful for managing flood Risk