Name of Candidate: **Rekha Gupta**

Name of Supervisor: **Dr. S. K. Naqvi**

Department/ Center: **FTK- Center for Information Technology**

Title of Thesis: **A Critical Success Factors based Framework for ERP Implementation Projects**

ABSTRACT

Enterprise Resource Planning (ERP) systems are enterprise-wide systems that provide seamlessinformation flow throughout the organization and help integrate and automate the business processes across various functional areas. It thus enables an organization achieve competitive and strategic advantage. However, ERP implementation is believed to be a high risk investment process as it requires substantial financial commitments and has an inherent high failure probability.Hence, risk aversion in ERP implementation projects is an active research area. The research studies on ERP implementation projects suggest two broad approaches for maximizing the ERP Project Success viz. enlisting of Critical Success Factors (CSFs) and developing suitable ERP Selectiontechniques. The enlisting of CSFs is believed to help monitor critically relevant and vital issues concerning ERP implementation. Since investment in ERP is a big risk, suitable software package selection assumes sizable importance for the implementing organization from strategic, operational, managerial and financial perspective.

However, significant research gaps were identified after reviewing both CSFs and selection studies spanning over two decades. The notable mentions include non- availability of a comprehensive CSFs listing, lack of objective framework for CSFs monitoring and control and non-existence of an automated CASE tool to monitor ERP Projects through the identified CSFs.

It was further evident from the studies that despite of several proposed CSFs models for ERP implementation, little evidence exist showing their usability in real scenarios. This indicated that while CSFs have been proposed for ERP implementation, little attention has been paid to recommend strategies to put them to practitioners' use.

To address the identified research gaps we have proposed a framework viz, **C**ompleteness, **O**bjectivity,**USage** (**COUSage**) as a viable solution. The COUsage framework consolidates dispersed CSFs from various studies and extends the list to include few more. The validation support for the listing was drawn both theoretically and practically. The comprehensive listing was validated by use of Technology-Organizational-Environment (TOE) framework and support theories. A field survey using questionnaire of 90-Indian companies and subsequent Factor Analysis and Spearman Rank Correlation helped establish the credentials of enlisted CSFs. A total of 11-top level CSFs and 119-sub-factors were enlisted. Hence, being comprehensive, it assures coverage of CSFs across a larger spectrum.

The prioritization algorithm, proposed as part of COUsage framework, enables ERP implementers prioritize the CSFs as per their specific requirements. No other CSF model provides this flexibility to the implementing organization.The thesis proposes an OWA operator based approach for top-level CSFs and Consensus based approach for the sub-factors. This new prioritization approach for ERP CSFs is low on time complexity and has simpler mathematical calculations compared to the established techniques of AHP and Fuzzy AHP.

The framework is also an attempt to bridge the gap between the theoretical CSFs models and practical expectations of implementing organizations. Keeping in view their varying requirements, environment and constraints the framework introduces a novel concept of CSF prioritization. Concept of objectivity of CSFs

realized and monitored through Key Assumption Set (KAS), Key Information Set (KIS) and Key Decision Set (KDS)is another facet of the framework which can help development of an appropriate CASE tool for controlling and evaluating an ERP project execution. The significance of the COUsage framework lies in its ability to effectively address the gap that exists between theoretical formulation of CSFs and their practical utility. The important concept of objectivity of CSFs enables the implementing organization monitor the CSFs effectively during the project execution.

All these features make development of a CASE tool based on COUsage feasible. Such a CASE tool would let manger prioritize CFSs, establish parameters for monitoring & control and produce useful alerts during execution of project to ensure minimum risk to the project.

This work also abridges the two ERP risk aversion camps viz. CSF Approach and ERP Selection Model Approach via a proposed selection framework. Further, we have implemented an algorithm that utilizes the CSFs identified by the implementing organization(as per their costs and benefits criteria) as input to the ERP Selection Model. The algorithm uses Fuzzy TOPSIS to identify the appropriate ERP software product by computing the closeness coefficient. The closeness coefficient determines the distance measurement from the Fuzzy Positive Ideal Solution and Fuzzy Negative Ideal Solution. An ideal product solution lies close to the Fuzzy Positive Ideal Solution and far away from the Fuzzy Negative Ideal Solution. It was also seen that Fuzzy TOPSIS algorithm has lower time complexity when compared with Fuzzy AHP approach with consistency check besides maintaining not null weights, agility and rank consistency.