EXECUTIVE SUMMARY

In today’s global environment, corporates are venturing beyond national boundaries in the pursuit of business opportunities. With stringent market conditions and highly dynamic business environment, organizations are targeting a multifaceted growth. Measuring and evaluating the present status of an organization, considering various dimensions including financials, operational, economical, etc. is a challenge. For this reason, there is a need for a comprehensive performance measurement system.

In order to study and understand the management practices and various performance evaluation practices that are prevalent in Indian corporate organizations, a pilot study of corporate organizations was conducted. The pilot study was followed by a detail literature review of various Multi-Criteria Decision Making (MCDM) tools such as Data Envelopment Analysis (DEA), Super Efficiency DEA (SDEA), Technique of Order Preference by Similarity to Ideal Solutions (TOPSIS) and Stochastic Frontier Analysis (SFA). Findings of the pilot study and the analysis of applications of different MCDM tools (literature review) defined the basic framework needed for exploring the possibility of integrating different MCDM tools for effective application in complex decision making situations.

The broad objectives of the study were:

- To look for possibilities and develop model/s that will suit different requirements.
- To develop various frameworks using two or more MCDM tools to
  - Benchmark the best performance of a business unit as compared to the best and the worst in the similar business vertical.
  - Benchmark the average performance of a business unit as compared to the best and the worst in the similar business vertical which will account for random error.
  - Benchmark the average performance of a business unit as compared to only the best in the similar business vertical which will account for random error.
- To evaluate and analyze the performance of any corporate organization using the proposed model/s.
- To carry a comparative analysis of the different performance evaluation models proposed.
- To conduct an evaluation of the proposed models and gauge its competence ability.
The research gaps identified based on literature review enabled carves scope for this research. Based on this study, different efficiency ranking methods namely; Efficiency Ranking Method using DEA and TOPSIS (ERM-DT), Efficiency Ranking Method using SFA and TOPSIS (ETM-ST) and Efficiency Ranking Method using SFA and SDEA (ERM-SSD) are proposed. The characteristics of the proposed models are as follows:

The **ERM-DT model**: This proposed model benchmarks the performance of a DMU obtained (using DEA) with the best and the worst performance (using TOPSIS). The model ranks DMUs based on minimum distance from the best performing alternative/DMU and the maximum distance from the worst performing alternative/DMU. Traditionally, a decision maker looks for the best alternative in order to improve his/her business performance. This approach also proposes a tie breaking procedure, thus enabling better decision making.

The **ERM-ST model**: The proposed model benchmarks the average performance of a DMU (obtained using SFA) with the performance of the best and the worst DMUs (obtained using TOPSIS). It is seen that SFA is generally not used when data consists multiple outputs. The proposed approach ERM-ST can handle such a case with multiple outputs and multiple inputs without a need to develop an aggregate measure of outputs. While measuring a technical efficiency of a DMU, SFA acknowledges stochastic nature of data and separates random noise from inefficiency and hence, the technical efficiency obtained through SFA can said be more precise. Thus, the proposed model can be of great relevance to a practical situation which generally deals with the data that has random fluctuations.

The **ERM-SSD model**: The proposed model recommends the best alternative whose average performance (using SFA) is evaluated against the best DMU (using SDEA). It incorporates stochastic nature of the data and measures technical efficiency of a DMU after separating out inefficiency and random shock due to exogenous variables (if any). Major advantage of this model is its applicability with multiple outputs and multiple inputs in an SFA framework. Further, this model can be applied when the data contains exogenous variables. For example, performance of a bank-branch may get affected by number of factors that are out of control of the decision maker such as the geographical location it operates in, population in the vicinity of the branch, number of years of its existence, competitors presence etc. The proposed model ERM-SSD will be most suited in such scenario.
Secondary data from different sources were considered for verifying different models proposed in this study. Proposed models are illustrated using hypothetical data and are applied to the data obtained from service sector and manufacturing sector. Data from twenty six public sector banks in India (accounting almost ninety percent of Indian banking business) and from fifteen Indian cement companies (which cover more than ninety percent cement market) were considered.

Different computer softwares were used in this study for evaluating proposed models. These softwares are DEAP (for DEA), DEA-Solver (for Super efficiency DEA), FRONTIER (for SFA) and M S Excel (for TOPSIS).

An evaluation of the proposed models was conducted by comparing the ranks assigned by each of the proposed models with those obtained by conventional models using Spearman’s rank test and Mean Squared Deviation (MSD) method. Significant association/correlation was observed between the ranks assigned by

- ERM-DT and CRS-DEA
- ERM-DT and SDEA.
- ERM-ST and TOPSIS
- ERM-ST and SDEA

No significant/correlation was found between the ranks assigned by

- ERM-SSD and CRS-DEA
- ERM-SSD and SDEA.

The results were found to be consistent for various data sets considered.

One of the major achievements of this study is that the models proposed are able to overcome some of the limitations of the conventional efficiency measurement tool while preserving their individual strengths. Moreover, each of the proposed models provides a tie-breaking method while ranking these DMUs. Also, each model can consider financial as well as non-financial parameters as input or output variables.