

**UNIVERSITI TEKNOLOGI MARA**

**TECHNICAL REPORT**

**MODEL OF RESTRICTED DATA ENVELOPMENT ANALYSIS BY  
CORRELATION COEFFICIENTS: AN APPLICATION TO FINANCIAL  
COMPANIES IN MALAYSIA**

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## **ABSTRACT**

Estimating a company's capacity to make a profit or generate income is vital in order to gain insight into financial management, financial reporting, and financial decisions. Due to its power to handle numerous inputs and outputs, Data Envelopment Analysis (DEA) has been applied by numerous researchers worldwide to gauge the effectiveness of businesses and other industries. However, one issue with DEA is that many inputs and outputs have zero weights assigned to them indicating the respective inputs and outputs are dropped from efficiency evaluation. Therefore, the results produced are inaccurate. The main objective of this study is to reduce zero weight in DEA by using the hybrid method by integrating the BCC model and Assurance Region method where correlation coefficients of inputs and outputs are used as weight restrictions. The hybrid method is labelled as BCCCOR model. The method is then used to evaluate the efficiency of Malaysian financial institutions. The input-oriented BCC integrated was chosen. 18 financial companies in Malaysia were chosen as Decision-Making Units (DMUs) where data for the period of 2017 to 2020 was used. Current ratio, debt to assets ratio, debt to equity ratio, and risk were selected as input factors, whereas return on equity, return on assets, and earnings per share were chosen as output variables. The outcomes demonstrate that the proposed hybrid BCCCOR method was successful in reducing input and output zero weights for four consecutive years. The result revealed that there were seven banks were consistently rated as efficient for four years running namely Apex Equity Holdings Berhad (APEX), Bursa Malaysia Berhad (BURSA), Hong Leong Bank Berhad (HLBANK), Hong Leong Capital Berhad (HLCAP), Insas Berhad (INSAS), K & N Kenanga Holdings Berhad (KENANGA), and OSK Holdings Berhad (OSK), indicating that financial institutions use inputs effectively to produce outputs. Future researchers are recommended to integrate the DEA method with another technique for identifying efficiencies, such as the Analytic Hierarchy Process (AHP), the Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS), the DEA-TOBIT method, or any other multi-criteria decision analysis techniques.