# THE DOCTORAL RESEARCH

## ABSTRACTS

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*Leading You To Greater Heights, Degree by Degree*

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| Name | : | **Zalina Binti Zahid** |
| Title | : | **Modeling Relative Efficiency And Productivity Change Using Data Envelopment Analysis And Regression Models** |
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This thesis developed the panel DEA model to measure the relative efficiency and the productivity change of 17 faculties in Universiti Teknologi MARA (UiTM), Shah Alam, covering the period, 2000-2005. Three types of approaches were used under the panel DEA model, namely, the contemporaneous, the inter-temporal and the productivity approaches. The first two approaches were incorporated under the two-stage approach to measure efficiency and to determine the effects of selected external factors on efficiency performance. To enhance the robustness of the results, the DEA models were constructed based on three alternative data sets which consisted of different input specifications (DEA1, DEA2 and DEA3). In the first stage of the two-stage approach, two different types of DEA models were fitted on the three data sets. First, the original DEA models were used to compute the efficiency scores. Second, the Super Efficiency DEA models were applied to detect

the outliers along the frontiers of the original DEA models. However, when a sensitivity test using the Spearman's Rank Correlation Coefficient was applied, the results showed that the original DEA models were not sensitive to the existence of the outliers along their frontiers. In addition, the original DEA models were also found not to be sensitive to three different input specifications. Therefore, the original DEA models were considered to be robust and appropriate to be used to measure efficiency. Overall, the results showed that the efficiency scores from the three input specifications were consistent and their means of annual efficiency followed the same trend. Using trend analysis, it was shown that UiTM faculties displayed a mixture of patterns in their efficiency performance. A group of 8 faculties exhibited positive trend with non-science faculties consistently performed better than the non-science faculties. Meanwhile, in the second stage of the two-stage approach, the influences of four selected non-discretionary factors (age of faculties, percentage of associate professors and above, percentage of part-time students and ratio of non-academic staff to academic staff) on the efficiency of the faculties were determined using two statistical models, namely, OLS Regression and Tobit Regression. Both methods consistently show that the age of faculties has no effect on the efficiency performance across all input specifications. However, the percentage of associate professors and above and the staff ratio were found to be significant under DEA1 and DEA3 specifications. The first variable was negatively related but the second variable was positively related with efficiency. Meanwhile, only the percentage of part-time students was found to be significant and positively correlated with the efficiency scores under all input specifications. In the second approach of the panel DEA model, the DEA based Malmquist Total Factor Productivity (TFP) Index was used to measure the productivity change of the 17 UiTM faculties during the study period. Using DEA1 and DEA2 specifications, it was found that on the average, the 17 UiTM faculties experienced a decrease in their productivity levels over the study period. This was due to the decrease in the technological change but with slight improvement in the technical efficiency.