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MEASURING EFFICIENCY AND RANKING THE PUBLIC UNIVERSITIES IN MALAYSIA USING DATA ENVELOPMENT ANALYSIS MODELS

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ABSTRACT

Universities play a vital role in a country's growth and have the potential to stay in the field of higher education by determining their performance. Thereby, management will not know whether or not university performance is profitable if it is not measured. Therefore, this project was carried out to determine the efficiency of public universities in Malaysia using Data Envelopment Analysis (DEA) models such as CCR, SBM, Super Efficiency, Super SBM, and Cross Efficiency are used to calculate each DMU's relative output as well as rank them. In this project, the data of 20 Malaysian public universities in 2011 are used to study the methods for measuring the efficiency of DMUs in the presence of 3 inputs and 5 outputs. DMU will be efficient if and only if the optimal value of efficiency is equal to 1; otherwise, it is inefficient. By using CCR, SBM, and Cross Efficiency models, it shows that 11 DMUs out of 20 DMUs were considered as efficient with an efficiency score of 1 while others are inefficient with a range score of 0.0564705 to 0.8907719. Additionally, Super Efficiency and Super SBM are used to rank the efficient value from CCR and SBM models, with a higher value indicating a more efficient unit. Cross Efficiency is used to measure efficiency and its ranking based on average. In comparison, Universiti Pertahanan Nasional Malaysia is stated as the most efficient university for both Super Efficiency and Super SBM models, while Universiti Utara Malaysia has the highest score in Cross Efficiency. In contrast, UMK for all models was recorded as the most inefficient with the lowest efficiency score compared to other public universities. Thus, the reference set of efficient universities needs to be used by inefficient universities to improve their performance, whereby, universities could maximize their efficiency.

Keywords: data envelopment analysis models, efficiency score, ranking, university performance

1 INTRODUCTION

1.1 Research Background

The definition of high-level education may differ depending on the laws and culture of the country. Higher education is the third level of education after high school. There are a few similar features of higher education, regardless of which form of post-secondary school one attends. Thus, higher education is any of the different types of education provided in post-secondary institutions of learning that leads to the granting of a specified degree, diploma, or certificate of higher studies at the end of a course of study (Chang & Wang, 2020). Higher-educational institutions include not only universities and colleges, but also professional schools that prepare students for careers in science mathematics, law, theology, medicine, business, music, and the arts. The completion of secondary education is the most common admission criteria for most higher-educational institutions, and the average entrance age is around 18 years old (Collegiate, 2020). The Ministry of Higher Education is in charge of regulating the operation of Malaysia's higher education institutions (HEIs). The academic industry has historically had the highest national development budget, demonstrating the Malaysian government's priority to education (*Ministry of Education Graduate Tracer Study*, 2021). According to Education Malaysia Global Services, Malaysia hosts more than 100 institutions in both public and private universities, as well as overseas branches of prestigious universities from United States, United Kingdom, Australia, and Ireland. Additionally, in the provision of higher education, both public and private education providers play equally crucial functions which focus on giving a variety of study programs. HEIs provide programs leading to the granting of certificates, diplomas, and postgraduate. In Malaysia, higher education institutions are classified into two parts such as public higher education institutions and private higher education institutions. Public institutions are government-funded higher education institution that lies under the Ministry of Education Malaysia's responsibility. Public universities, polytechnics, and community colleges are

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