UNIVERSITI TEKNOLOGI MARA

TECHNICAL REPORT

EVALUATION OF THE EFFICIENCY FOR WATER SERVICE BY THE STATE IN MALAYSIA USING THE NETWORK RUSSELL MODEL

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IN THE NAME OF ALLAH, THE MOST GRACIOUS, THE MOST MERCIFUL

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ABSTRACT

Water is an essential component of human life and a significant resource for the development of society. It is therefore essential to improve the quality of the water supply and guarantee that its services are consistently effective in satisfying societal demand. To assure the efficiency of the water supply service, which is in high demand due to population expansion, (Suruhanjaya Perkhidmatan Air Negara, 2007) SPAN has been appointed to oversee the water distribution system and to evaluate the performance of water operators. This study aims to evaluate the performance of Malaysia's water delivery networks and rank the states according to that performance. For evaluating water service, a two-stage network structure unit is acceptable. The activities related to the provision of water are divided into two stages: the first stage is the water treatment process, which entails the purification and hygienic treatment of the water, and the second step is the distribution process. The conventional DEA is insufficient for determining the overall effectiveness of water service providers when network processes and undesirable output are considered. To assess the overall effectiveness and efficiency of the intermediate process, a modified Network Russell (NR) with an unwanted output which is Non-Revenue Water (NRW) will be used. This approach can assess the effectiveness of process-related stages as well as overall effectiveness within a single, integrated framework. The Non-Revenue Water (NRW) element is also highlighted in this study as a problem that affects the reputation of water service by state in Malaysia and around the world. After that, the NR-UO technique's output was compared to that of the NSBM-UO DEA approach. The difference between the water produced at the water treatment facility before being provided and the water bill at the customer's location is what is referred to as NRW. The outcome indicates that the NR-UO model is suitable for use as an additional performance indicator in Malaysian water delivery services, as demonstrated by the results. Using NR-UO and NSBM-UO methodologies, Selangor appears to be efficient and can be chosen as the benchmark state for consistently efficient for 2015, 2019 and 2020. This suggests that the NR-UO method, a different approach from the one currently used by SPAN, can be used to measure the effectiveness of water service providers in Malaysia.