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Cross-Efficiency Data Envelopment Analysis of Basic Healthcare in the City of Lagos

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Introduction

Most nations have battled in recent years with the effects of budget cuts in health spending, forcing them to make effective use of their resources. In this situation, performance evaluation helps with decision-making so that the healthcare system may operate more effectively. However, evaluating how well various sectors, including the healthcare systems, are performing is both a difficult problem to solve and a helpful tool for decision-making with the goal of maximising the use of resources. In this study, a new methodology is proposed that combines two well-known analytical techniques: data envelopment analysis (DEA), which is used to measure efficiency, and data science, which is used to complement the DEA model and offer insightful recommendations for making strategic decisions about productivity enhancement [1].

Mathematical programming is typically used in management situations to examine a variety of potential alternative courses of action before choosing the optimal one. In this role, mathematical programming assists management with planning. In the opposite direction, Data Envelopment Analysis uses mathematical programming to generate ex post facto assessments of the relative efficacy of management successes, regardless of how they were planned or carried out. Thus, the use of mathematical programming is broadened to include employment as a tool for control, evaluation, and planning of future endeavours. In their Data Envelopment Analysis methodology, Charnes, Cooper, and Rhodes introduced the CCR ratio form, which understands both technical and scale inefficiencies through the optimal value [2].

The methods presented in this research achieve a separation into technical and scale efficiencies without changing the latter prerequisites for using DEA directly on observational data. Failure to achieve the highest levels of output and/or excessive input utilisation is indicators of technical inefficiency. The magnitudes of these inefficiencies can be identified and fixed using techniques that are described. The current study introduces a new independent variable that enables analysis of whether operations took place in regions of growing, constant, or falling returns to scale (in multiple input and multiple output situations). The findings are addressed and related to both more contemporary versions of economics as well as traditional (single output) economics [3].

Description

As of right now, Indonesia has a rising number of government-owned hospitals having the BLU/BLUD designation. The number of hospitals with BLU/BLUD designation increased from 241 in 2014 to 353 in 2016, with 74 BLU hospitals and the remaining 279 BLUD. Even while the number keeps growing, not all government-owned hospitals, particularly local government hospitals, are BLU. This is a result of certain local governments' lack of commitment to granting their hospitals financial management autonomy, despite the fact that hospitals generate some of their most important revenue. Hospitals in Indonesia are classified as Class A, B, C, and D based on their resource availability. Class A hospitals have been designated as the best since they can supply specialists and subspecialists in medicine [4].

Internists, surgery, child health services, and obstetrics are the four different categories of specialist care. These hospitals are constructed as level 2 healthcare facilities that can accept referrals from level 1 healthcare facility. They are located in cities or districts. Class D hospitals are in a transitional stage since they will eventually be upgraded to Class C status. General medication and dental treatment are the only services that Class D hospitals can offer. Class D hospitals accept referrals from level 1 healthcare facility just like Class C hospitals do. The growth of Indonesian hospitals is currently accelerating, according to Indonesian Health Profile. The number of hospitals has increased from 1,268 to 2,488 since the year 2005. The strategy to require health insurance for everyone should theoretically increase people's access to medical facilities. However, this approach has also severely depleted resources in Thailand, where it is necessary to closely monitor it. In the early years of Thailand's universal health care system, hospitals had a limited budget, which led to their own financial difficulties [5].

The term "efficiency" is frequently used in economics, and it typically refers to the best way to use resources to produce goods or services. Efficiency in the context of healthcare refers to the best possible use of resources in hospitals to provide the greatest amount of output. Efficiency is broken down into two subdimensions in the research carried out by the Europe Path project to quantify the attainment of efficiency: "the relationships between the treatment's input and output" and "the exploitation of technology to generate the best treatment feasible." There are three different types of efficiency from the viewpoint of the corporation. Economic efficiency is commonly defined as the relationship of the number and quality of specific outputs by employing certain inputs which can reduce the production costs, according to the Institute of Medicine of the National Academies. Doctors, nurses, and other types of raw materials can be used in various combinations as inputs to produce various quantities and qualities of certain outputs. Typically, only one input-production-cost-efficient combination can result in a given set of outputs. The efficiency issues were raised to address queries regarding whether the service costs incurred by specific units are enough. Low service volume hospitals are more likely to have extremely high unit costs or to operate with rather. The sole source that was available on a national basis in 2017 was health. The availability of the data nationally accessible in the database served as the basis for the input and output indicators in this study. The list of BLU and BLUD hospitals utilised to fund health facility research by the Indonesian Ministry of Health in 2016 was the source of the hospital samples. The samples were originally only 84 hospitals, but after data cleaning was done based on the data's availability, the indicators utilised in the online hospital reporting database were decreased by 2 hospitals, making the samples just 82 hospitals.

Conclusion

This study focused on two factors when determining input indicators: the availability of the said indicators in the hospital's reporting database and past studies about the usage of input indicators in hospitals using the DEA

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technique. The most often used input indicators, according to prior research, are the number of hospital beds, doctors, nurses, and other staff members. The number of doctors, nurses, other staff members, and beds will be used as input indicators for this study based on those conducted in the past. This study also demonstrated the effectiveness of Puskesmas as a gatekeeper for the tiered referral system, despite the fact that it also had certain unfavourable effects on hospitals, such as a decline in efficiency. Hospitals that once had a lot of resources are now using them less effectively since fewer people are visiting them. The best course of action is to carry out input retribution by moving physicians, nurses, and other staff members to Puskesmas in order to achieve efficiency while bolstering Indonesia's primary healthcare system. Hospitals with abundant resources that produced large outputs-patients in this context-are now less efficient as a result of a decline in patient visitation.

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