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Window Analysis and Malmquist Index for Assessing Efficiency and Productivity Growth in a Pharmaceutical Industry

Authors : Abbas Al-Refaie, Ruba Najdawi, Nour Bata, Mohammad D. AL-Tahat

Abstract : The pharmaceutical industry is an important component of health care systems throughout the world. Measurement of a production unit-performance is crucial in determining whether it has achieved its objectives or not. This paper applies data envelopment (DEA) window analysis to assess the efficiencies of two packaging lines; Allfill (new) and DP6, in the Penicillin plant in a Jordanian Medical Company in 2010. The CCR and BCC models are used to estimate the technical efficiency, pure technical efficiency, and scale efficiency. Further, the Malmquist productivity index is computed to measure then employed to assess productivity growth relative to a reference technology. Two primary issues are addressed in computation of Malmquist indices of productivity growth. The first issue is the measurement of productivity change over the period, while the second is to decompose changes in productivity into what are generally referred to as a 'catching-up' effect (efficiency change) and a 'frontier shift' effect (technological change). Results showed that DP6 line outperforms the Allfill in technical and pure technical efficiency. However, the Allfill line outperforms DP6 line in scale efficiency. The obtained efficiency values can guide production managers in taking effective decisions related to operation, management, and plant size. Moreover, both machines exhibit a clear fluctuations in technological change, which is the main reason for the positive total factor productivity change. That is, installing a new Allfill production line can be of great benefit to increasing productivity. In conclusions, the DEA window analysis combined with the Malmquist index are supportive measures in assessing efficiency and productivity in pharmaceutical industry.

Keywords : window analysis, malmquist index, efficiency, productivity
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