

Performance Evaluation Using PCA and DEA: a Case Study of the Micro and Small Manufacturing Industries in Indonesia

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ABSTRACT

Companies frequently evaluate their business performance based on existing advantages and shortcomings. Data envelopment analysis (DEA) is a useful decision-making tool for doing so; it evaluates the relative efficiency of a department or unit as a decision-making unit (DMU). It is also a powerful tool for studying production limits by using multiple inputs and outputs. Principal component analysis (PCA) is a technique for simplifying a data set by reducing multidimensional data sets to lower dimensions for analysis; it reduces the dimensions of input and output variables. This study evaluated the performance of the micro and small manufacturing industries (MSMI) in Indonesia using a combination of Principal Component Analysis and an Input-Oriented DEA Envelopment Model. Development of micro and small manufacturing industries in Indonesia is inhibited by various factors. Based on our results, we determined that the following factors were causative for MSMI in Indonesia: marketing, human resources, materials, machinery, capital and finance, product, technology, support, research & development, distribution, promotion, competitors, and policy.

Keywords: Performance evaluation, Micro and small manufacturing industries, Variable selection, PCA, DEA