

**DOMINANCE BASED MEASUREMENT OF ENVIRONMENTAL  
PERFORMANCE AND PRODUCTIVE EFFICIENCY OF  
MANUFACTURING**

Paul T. Otis

Dissertation submitted to the faculty of the  
Virginia Polytechnic Institute and State University  
in partial fulfillment of the requirement for the degree of

Doctor of Philosophy  
in  
Industrial and Systems Engineering

Konstantinos P. Triantis, Chair  
Donald A. Drew  
Thomas J. Grizzard  
Patrick C. Koelling  
William G. Sullivan

April 10, 1999  
Blacksburg, Virginia

Keywords: dominance, productive efficiency, environmental performance, benchmark  
correspondence, data envelopment analysis

# **DOMINANCE BASED MEASUREMENT OF ENVIRONMENTAL PERFORMANCE AND PRODUCTIVE EFFICIENCY OF MANUFACTURING**

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(ABSTRACT)

The concept of efficiency measurement is based on the definition of a frontier that envelopes observed production plans. The effect of pollution on productive efficiency is typically studied by considering pollution as not freely disposable (i.e., there is a cost incurred to dispose of pollution) or by assigning shadow prices to pollution outputs. However, the frontier along with the required technological assumptions (such as convexity) needed for a definition of a frontier may be replaced with the concept of pair-wise dominance. With data from a manufacturing facility, the use of pair-wise dominance allows one to consider a wide spectrum of inputs and outputs. Pair-wise dominance can also be applied to segregate production plans into sets according to their relative environmental performance and productive efficiency. These sets are used to identify reference production plans upon which distance-based measures of performance are defined. This research applies pair-wise dominance to time series data from a printed circuit board manufacturing facility to illustrate the approach. The proposed approach is compared to the Data Envelopment Analysis (DEA) approach. It was observed that for detailed production data the proposed approach was more informative concerning the measurement of productive efficiency than the standard methods.

## **ACKNOWLEDGEMENTS**

The author would like to thank Mr. C. M. (Kip) Robinson, Jr., Manager, Energy Services, Virginia Power for assistance in identifying an industrial partner for this research. The industrial partner for this research wishes to remain anonymous. The author would like to thank the many individuals at the industrial facility that participated in this research for their assistance in obtaining data and for the time they took to answer questions. The author also thanks Dr. Konstantinos Triantis for his patience, insight, and support during the long process leading to this dissertation.

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