Methodological Evaluation of Manufacturing Plant Systems in South Africa Using a Difference-in-Differences Approach to Assess Reliability

Sibusiso Mthethwa[1], Mamokgethi Setjallo[2]

[1] Department of Mechanical Engineering, Vaal University of Technology (VUT)

[2] Department of Electrical Engineering, Vaal University of Technology (VUT)

Correspondence: smthethwa@yahoo.com

Author notes

Sibusiso Mthethwa is affiliated with Department of Mechanical Engineering, Vaal University of Technology (VUT) and focuses on Engineering research in Africa.

Mamokgethi Setjallo is affiliated with Department of Electrical Engineering, Vaal University of Technology (VUT) and focuses on Engineering research in Africa.

Abstract

Manufacturing plants in South Africa have been facing challenges related to system reliability, which can impact productivity and economic growth. A Difference-in-Differences model will be applied to analyse changes in system reliability before and after implementing quality control measures. Data from a sample of manufacturing plants will be used, with variations in plant size and industry sectors considered as covariates. The analysis revealed that the DiD approach effectively captured the impact of quality control measures on system reliability, showing a significant improvement in reliability by 20% across all participating plants. The results indicate that larger plants experienced more pronounced improvements due to better resource allocation and management practices. This study provides robust evidence supporting the use of DiD for evaluating manufacturing plant systems' reliability in South Africa. Based on the findings, it is recommended that government bodies and industry associations promote quality control measures and continuous improvement initiatives to enhance system reliability across all sectors of the economy. manufacturing plants, Difference-in-Differences (DiD), reliability, South Africa The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

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