

Performance Analysis of Footwear Manufacturing Assembly Line Using Value Stream Mapping-Simulation Modeling

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Abstract

This research aims to analyze footwear manufacturing assembly lines' performance and increase its production by maximizing the measurement of performances like throughput and resource utilization with a case study. A shoe model with 46 components has been selected from the case company. The study starts with VSM to visualize the process flow, identify the production status, and any potential alerts. A discrete event simulation model is used to analyze precisely the manufacturing system's actual performance without disturbing the real system. After analyzing the collected data using the Arena input analyzer, a simulation model was developed, verified, validated, and run for 40 replications. Six proposed alternative solutions have experimented with Arena simulation software, and the best alternative solution results in improvement of output from 191 to 278 and from 174 to 536, line balance efficiency from 68.3% to 90.1%, and from 17.6% to 76% in stitching and lasting assembly lines, respectively.

Keywords

Operational performance, Quality management, developing country, low-level technology and Ethiopia.

Biography

Hiluf Reda is Assistant Professor in Industrial Engineering Department. In addition, he serves as coordinator for International Relations and Partnership, Debre Berhan University, Ethiopia. He received his PhD in Industrial Engineering from Indian Institute of Technology Roorkee, India in 2022. He received his MSc in Mechanical Engineering (*Industrial Engineering stream*) from Addis Ababa University, Institute of Technology, AAiT, Ethiopia in 2014. He has more than ten years of teaching / industrial experience in the fields of quality engineering, manufacturing systems design and analysis, simulation modeling, supply chain management, and automobile engineering.