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Labour-intensive manufacturing industries often face productivity challenges because of inefficient production methods and ineffective use of production resources, increasing manufacturing costs and reducing profitability (Saad et al., 2023). This research investigates how optimizing production methods can improve productivity and financial performance using historical production data from a textile manufacturing company in Bangladesh.

I compared production performance before and after implementing an optimized production method using matched production records extracted from the company's Enterprise Resource Planning (ERP) system, which stores operational and production data. I used graphical analysis, descriptive statistics, paired t-tests, financial evaluation, and Monte Carlo simulation—a statistical technique that evaluates performance under different production scenarios—to assess operational and financial outcomes. Root-cause analysis using a fishbone (cause-and-effect) diagram identified inefficiencies in production methods, workflow, machine configuration, and technical coordination, guiding targeted engineering improvements.

The results showed significant improvements in production output, operational efficiency, manufacturing cost, Cost of Making (CM) earnings, Free on Board (FOB) earnings, and overall profitability after implementing the optimized production method. Statistical analysis confirmed that these improvements were significant ($p < .001$), while the simulation demonstrated that the improvements remained robust under varying production conditions.

This presentation demonstrates how historical production data, root-cause analysis, and engineering-based process optimization can identify productivity bottlenecks, implement practical manufacturing improvements, and validate their effectiveness using statistical and simulation-based methods. The findings provide practical evidence that data-driven engineering approaches can improve productivity and profitability in labour-intensive manufacturing without requiring major capital investment.

Keywords

Historical Production Data, Production Method Optimization, Standard Minute Value (SMV), Root Cause Analysis, Productivity Improvement, Cost of Making (CM), Monte Carlo Simulation, Labour-Intensive Manufacturing

References

Saad, S. M., Bahadori, R., Bhovar, C., & Zhang, H. (2023). Industry 4.0 and lean manufacturing – a systematic review of the state-of-the-art literature and key recommendations for future research. *International Journal of Lean Six Sigma*, 15(5), 997–1024. <https://doi.org/10.1108/ijlss-02-2022-0021>