

Integration of simulation and Lean six sigma in improving productivity: Case study in steel shaft manufacturing SMEs

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Abstract

Steel manufacturing is one of the main sectors of the economy. In South Africa this sector is highly fragmented relating to productivity and consists mostly of small and medium-sized enterprises (SMEs). The main problem is a low productivity in steel manufacturing SMEs impact negatively on competitiveness of the industry. The purpose of this paper is to identify bottleneck causing production flow inefficiencies. This includes elimination of waste, non-value adding activities, defects and production variation in steel manufacturing industries. The author observed steel material arrival on machine, the processing times, work-in progress ranging from sawing, milling to threading that is intended for further production processing computer numerical control (CNC) machinery in order to enhance productivity. The system dynamic modelling was simulated to verify and validate the reality of manufacturing process aimed at identifying manufacturing process bottlenecks. To date, only limited research has been conducted into integrating simulation and Lean Six Sigma (LSS) in the South African manufacturing sector. The findings suggest that simulation and Define, Measure, Analyse, Improve and Control (DMAIC) LSS are viable tool to assist manufacturing managers and supervisors in improving productivity process in steel manufacturing SMEs. The study findings also reinforced the value of Simulation and LSS in making informed decision relating to efficiency and effectiveness in the steel manufacturing SMEs.

Keywords: Productivity, steel manufacturing SMEs, Lean Six Sigma, Simulation.