

Six Sigma Application to Chip Shortage Crisis in Automotive Industry

Margot Fontaine

Student, Master of Science in Industrial Engineering
A. Leon Linton Department of Mechanical, Robotics and Industrial Engineering
Lawrence Technological University
Southfield, MI 48075, USA
mfontaine@ltu.edu

Ahad Ali

Associate Professor and Director of Industrial Engineering Program
A. Leon Linton Department of Mechanical, Robotics and Industrial Engineering
Lawrence Technological University
Southfield, MI 48075, USA
aali@ltu.edu

Abstract

This paper presents a Six Sigma-based approach to optimize the supply chain network and mitigate the risk of chip supply shortage in the automotive industry based on survey data. Six Sigma is a data-driven approach to quality control that emphasizes the importance of minimizing defects and reducing variability in processes. The proposed approach integrates the Six Sigma methodology into the optimization and risk mitigation process of the supply chain network. The methodology consists of five phases: Define, Measure, Analyze, Improve, and Control (DMAIC). This Study aims to suggest probable solutions for the chip shortage crisis. With deep statistical analysis, three root causes were identified a globalized semiconductor supply chain, an unoptimized supply chain network, and inventory management. In order to mitigate these problems, three probable solutions have been provided which are multisourcing, nearshoring, and increased lead time in the planning system.

Keywords

Six-sigma, DMAIC, chip shortage, automotive, supply chain

Biographies

Margot Fontaine is a dual Master student in Engineering Management and industrial Engineering of the Industrial Engineering Program in the A. Leon Linton Department of Mechanical, Robotics and Industrial Engineering at the Lawrence Technological University, Southfield, Michigan, USA. She earned a B.S. in Aviation and Space Management from Middle Georgia State University, Macon, Georgia, A.S. in Engineering Technology at Cowley Community College, Arkansas city, Kansas.

Ahad Ali is an Associate Professor and Director of Industrial Engineering Program in the A. Leon Linton Department of Mechanical, Robotics and Industrial Engineering at the Lawrence Technological University, Southfield, Michigan, USA. He earned B.S. in Mechanical Engineering from Khulna University of Engineering and Technology, Bangladesh, Masters in Systems and Engineering Management from Nanyang Technological University, Singapore and PhD in Industrial Engineering from University of Wisconsin-Milwaukee. He has published journal and conference papers. Dr Ali has completed research projects with Chrysler, Ford, New Center Stamping, Whelan Co., Progressive Metal Manufacturing Company, Whitlam Label Company, DTE Energy, Delphi Automotive System, GE Medical Systems, Harley-Davidson Motor Company, International Truck and Engine Corporation (ITEC), National/Panasonic Electronics, and Rockwell Automation. His research interests include manufacturing, simulation, optimization, reliability, scheduling, manufacturing, and lean. He is member of IEOM, INFORMS, SME and IEEE.