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Enhancing Agility of Supply Chains using Stochastic Models and Simulations

Dr. Alok K. Verma, CMfgE, P.E.

Ray Ferrari Professor

Chief Technologist – Lean Institute

MET –Program Director

Old Dominion University

Norfolk, Virginia- 23529

Phone: (757) 683-3766

Fax: (757) 683-5655

E-mail: averma@odu.edu

ABSTRACT

Managing supply chains in today's distributed manufacturing environment has become more complex. To remain competitive in today's global marketplace, organizations must streamline their supply chains. The practice of coordinating the design, procurement, flow of goods, services, information and finances, from raw material flows to parts supplier to manufacturer to distributor to retailer and finally to consumer requires synchronized planning and execution. Efficient and effective supply chain management assists an organization in getting the right goods and services to the place needed at the right time, in the proper quantity and at acceptable cost. Managing this process involves developing and overseeing relationships with suppliers and customers, controlling inventory, and forecasting demand, all requiring constant feedback from every link in the chain. Base Stock Model model is applied to three tier single-product supply chain to calculate order quantities and reorder point at various locations within the supply chain. A physical simulation is designed for base stock model to study the product flow within the supply chain. A computer based discrete event simulation model is also created to study the three tier supply chain and to validate the results of the Base Stock model. Results from the mathematical model, physical simulation model and computer based simulation model are compared. In addition, the physical simulation model studies the impact of lean implementation through various performance metrics and the results demonstrate the power of physical simulations as a pedagogical tool for training.