The development of a framework for Australian SMMEs collaboration in a global supply chain environment, Part 1: A conceptual model and solution approach

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Abstract

This paper presents a conceptual model development for Australian small and medium manufacturing enterprises (SMMEs) collaboration in a global supply chain environment. Specifically, it focuses on the design of a production distribution network model for SMMEs. The approach permits the use of any combination of participants; suppliers, manufacturers and distribution centers in order to find the optimum participant configuration to fulfil final customer demand. The parameter for the optimum solution is based on the minimum cost and time of the production and distribution process. Genetic algorithm (GA) was selected to optimize the participant configuration in the model. Due to the complexity and extent of the paper, it was presented in two sections. The first section deals with the conceptual development of a holistic collaborative production distribution network model for Australian SMMEs and the automatic generation of the initial population of chromosome in GA. The second section of the paper details the rest of the GA as a solution approach for the model. In the end, an example of applying the algorithm for the list of participants involved in the network model is presented.

Keywords
SMMEs, competitiveness, production distribution network

Biography

Mohammad Rizal Firmansyah is currently doing his PhD research degree at the University of South Australia under Indonesian Government Scholarship. He has worked in a Shipyard Industry for 1 year before being a Lecturer in Engineering Faculty Hasanuddin University, Indonesia. Since 2012, he became an International Member of the Society of Naval Architects and Marine Engineers (SNAME).

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**Yousef Amer** obtained his PhD in 2007 from the University of South Australia and developed a novel quantitative model to optimise supply chain processes using design for Six Sigma and fuzzy logic. He has worked in manufacturing and logistics for over 18 years. Dr Yousef Amer is a Lecturer and Program Director at the School of Advanced Manufacturing and Mechanical Engineering in University of South Australia. He has published many international peer reviewed research papers in the research fields of supply chain management, sustainability in manufacturing, integration and performance measurement, and business process re-engineering, three book chapters and two books. He is a member of the Barbara Hardy Institute, the Council of Supply Chain Professionals (CSCMP), Logistics Association of Australia (LAA), Chartered Institute of Purchasing and Supply (CIPS) and the Performance Measurement Association (PMA).

**Romeo Marian** graduated from the Technical University of Cluj-Napoca, Romania, with a BE (Hons) in Mechanical – Mechatronics Engineering, specialising in design of Machine-Tools and Robots. He also completed a Master of Science, organised under a Tempus Programme of the European Union by a cluster of European Universities. His doctoral studies, at UNISA, concerned the modelling and optimisation of assembly operations using Genetic Algorithms. He has extensive research and development experience in research organisations, industry and academia in a number of areas – in which he published – ranging from MEMS to heavy engineering, from mechanical, thermal (heat exchange and combustion), electrical (high potential electric fields) systems, fluid mechanics, hydraulic drives, to welding. His recent preoccupations and teaching include artificial intelligence, quality management, logistics and supply chain management and optimisation.