

The development of a framework for Australian SMMEs collaboration in a global supply chain environment, Part 2: Genetic operators and a case study

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Abstract

This paper presents a conceptual model development for Australian SMMEs collaboration in a global supply chain environment. Specifically, it focuses on the production distribution network problems amongst SMMEs. Due to the complexity and extend of the paper, it was split in two sections. Model development of a collaborative production distribution network has been discussed in the first section along with the development of chromosome encoding approach in GA. This second part details the rest of the genetic algorithm (GA) for the optimization process in the developed model. The developed GA in the first part was designed to work only with feasible chromosome. Hence, in this second part, other genetic operators were need to be modified in order to handle the constrained character of the developed chromosome encoding approach. In the end of the discussion, an example of applying the algorithm in the network model for optimizing the participants' configuration to fulfil final customer product demand is presented.

Keywords

Production distribution network, genetic algorithm, chromosome encoding approach, genetic operator

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). He obtained his BA in Naval Architecture in 1997 from Hasanuddin University, Indonesia, MEng in Marine Material and Production Engineering in 2002 from 10 Nopember Institute of Technology, Indonesia and MEng in Manufacturing Management from University of South Australia in 2009. He has involved in a number of collaborative researches with Shipyard Industries in Indonesia as well as with Indonesian Classification Bureau. His research interests include manufacturing, production management, optimization, quality management, supply chain management and transfer of technology. Mohammad Rizal Firmansyah is the corresponding author and can be contacted at mohammad_rizal.firmansyah@mymail.unisa.edu.au.

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.