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Optimization of Multi Commodities Consumer Supply Chain: Part 1- Modelling

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Abstract : This paper and its companions (Part II, Part III) will concentrate on optimizing a class of supply chain problems known as Multi- Commodities Consumer Supply Chain (MCCSC) problem. MCCSC problem belongs to production-distribution (P-D) planning category. It aims to determine facilities location, consumers' allocation, and facilities configuration to minimize total cost (CT) of the entire network. These facilities can be manufacturer units (MUs), distribution centres (DCs), and retailers/end-users (REs) but not limited to them. To address this problem, three major tasks should be undertaken. At the first place, a mixed integer non-linear programming (MINP) mathematical model is developed. Then, system's behaviors under different conditions will be observed using a simulation modeling tool. Finally, the most optimum solution (minimum CT) of the system will be obtained using a multi-objective optimization technique. Due to the large size of the problem, and the uncertainties in finding the most optimum solution, integration of modeling and simulation methodologies is proposed followed by developing new approach known as GASG. It is a genetic algorithm on the basis of granular simulation which is the subject of the methodology of this research. In part II, MCCSC is simulated using discrete-event simulation (DES) device within an integrated environment of SimEvents and Simulink of MATLAB® software package followed by a comprehensive case study to examine the given strategy. Also, the effect of genetic operators on the obtained optimal/near optimal solution by the simulation model will be discussed in part III.

Keywords : supply chain, genetic algorithm, optimization, simulation, discrete event system
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