July 14, 2022

Guest Editors

Dr. Ashutosh Sharma (Corresponding Editor)
Institute of Computer Technology and Information Security, Southern Federal University, Russia
Email**:** sharmaashutosh1326@gmail.com

Dr. Amit Sharma
Chitkara University Institute of Engineering and Technology, Chitkara University Punjab, India
Email: sharma.amit@chitkara.edu.in

Dr. Ruihang Huang
Donghua University, Shanghai, China
Email: 1209125@mail.dhu.edu.cn

Informatica An International Journal of Computing and Informatic – Special issue Recent Trends and Advances of Informatica in E-Commerce: Opportunities, Challenges and Solutions

please find the manuscript "A Hybrid Modelling Framework for E-commerce Supply Chain Simulation : Complex Adaptive Systems Perspective". This paper addresses the need for Modelling & Simulation (M&S) of supply chain as complex adaptive system (CAS), but with a novel application in the field of hybrid M&S, integrating top-down and bottom-up approaches using synthetic microanalysis, implementing a hybrid ABMS -DES simulation model of an e-commerce supply chain to perform simulation experiments to find natural emergent properties at certain levels, as result of the interactions between the constituent parts, so far lacking in the scientific literature. The paper includes problem formulation, and modelling, analysis, and validation methodology.

We consider that hybrid approach is necessary because when supply chain conceptualized as CAS, the challenge is to find the macro and micro mechanisms behind the *evolution*, *aggregate behavior, anticipation and* hierarchical *arrangements of boundaries and signals*. In this direction, the top-down approach is used to provide holistic perspective by synthetic microanalysis, in which experiments are performed to find natural emergent properties and delineate macroscopic phenomena with systemic concepts (Auyang, 1999). Once the system structures have been observed based on top-down perspective and the bottom has been reached, we need to analyze them in terms of the laws on their constituent parts combined with suitable idealization and approximation at the micro level, at this point, the bottom-up approach is a deductive perspective, in which experiments are performed to find natural emergent properties at certain levels as a result of the interactions between the constituent parts (Auyang, 1999). The implementation of models based on top-down

approach, which is used to provide holistic perspective by synthetic microanalysis, the System dynamics (SD) is preferred. While implementing models based on bottom-up approach, that is a deductive perspective, the Discrete-Event Simulation (DES) and Agent-based Modelling and simulation (ABMS). Combining two or more of the following methods: SD, DES, and ABMS, has experienced near-exponential growth in popularity in past two decades (Brailsford *et al*., 2019).

The manuscript has been prepared according to the Author guidelines. The manuscript is for a special issue ***Recent Trends and Advances of Informatica in E-Commerce: Opportunities, Challenges and Solutions***. We believe that this original research article is within the scope the special issue because it contributes to hybrid modelling combining application of DES and ABMS and includes a case study. Our main contribution is to adapt recognized knowledge for a complex adaptative e-commerce supply chain. On every phase, advantages of hybrid M&S and CAS approach are described and highlighted. In our supply chain cases, we took advantage of the two mentioned features. DES simulations, to incorporate time processes and indoor facilities behavior, and ABS, for interactions and flows between facilities, including transportation network and vehicles.

We hope that you will consider this manuscript for publication in ***Informatica An International Journal of Computing and Informatic*** – *Special issue* ***Recent Trends and Advances of Informatica in E-Commerce: Opportunities, Challenges and Solutions***. We await your response and the comments of reviewers.

Yours sincerely,

Alejandro Nila Luevano

Auyang S. (1999). “Foundations of complex-system. Theories in economics, evolutionary biology, and statistical physics”. Cambridge: Cambridge University Press.

Brailsford, S.C., Eldabi, E., Kunc, M., Mustafee, N., Osorio, A. F. (2019). “ Hybrid simulation modelling in operational research: A state-of-the-art review. European Journal of Operational Research, 278 (3), 721-737.