Special Issue:
New trends in Process Simulation and Modeling

Jose L. Salmeron

University Pablo de Olavide (SPAIN)

salmeron@upo.es

1   Introduction

This special issue of the Journal of Industrial Engineering and Management is focused on new trends in Process Simulation and Modeling.

Many business processes are so complex, interconnected and subject to variability. For those reasons, it is hard to understand the components evolution and interactions within the business processes without a dynamic model. Simulation and modeling approach is a good choice to predict processes performance, to compare alternatives and to establish the effect of several scenarios on performance. Moreover, if a process does not yet exist, or company is considering a new implementation, a simulation model can give a clue how well the proposed process will perform. In addition, process simulation and modeling is a growing and exciting research field.

In general terms, simulation is one of the most commonly used methodologies employed in Information Systems and Operations Management research. As Simulation: Transactions of The Society for Modeling and Simulation International shows, the methods and applications of modeling and simulation in both well-established and emerging areas include the fields of, but are not restricted to:

- Computer Science: Computer networking and communications, high performance computers, real-time systems, mobile and intelligent agents, simulation software, and language design.

- Engineering: System engineering and design, aerospace, traffic systems, microelectronics, robotics, mechatronics, and air traffic.

- Physical and Life Sciences: Chemistry, physics, biology, medicine, biomedicine, sociology, and cognition.

A simulation is simply an imitation of the operation of a real-world system or process for purposes of its evaluating. Over the last thirty years, computer simulation has enjoyed a great deal of popularity in the manufacturing, production, logistics, service, and financial industries, just to name a few fields of application.

In this sense, simulation is a powerful tool if understood and used properly. Simulations are often used to analyze systems that are too complicated to analyze with analytic methods such as calculus, standard probability and statistics, or queuing theory. An especially interesting feature of simulation is its ability to allow the experimenter to analyze and compare certain scenarios quickly and efficiently.

The focus of this special issue of the Journal of Industrial Engineering and Management is to publish high quality research papers that either addresses significant issues related to the use of simulation in process research. The goal of this special issue is on bringing together researchers and practitioners from the areas of process management, computational intelligence, decision support, simulation and modeling. The technical objective is to exchange ideas and techniques from those areas as well as to establish a framework for the development of methodologies that integrate decision support, process management, technology, simulation and modeling.

2   Overview of the papers

We found that the quality of papers was quite high and that they address a wide range of topics.

The first paper by Seyed-Mohammad Seyed-Hosseini and K. Khalili Damghani use fuzzy programming within a containers allocation problem in maritime terminal. The objective is minimizing the total distance traversed by the containers from the ship to the terminal area they are assigned. Fuzzy set concepts are used to treat imprecision regarding the distances between berth and terminals area, number of containers in an arrived ship and estimation of available area in each terminal at a

port. We proposed two types of models for optimistic and pessimistic situations. The proposed models have been coded in LINGO 8.0 solver and a numerical example has been solved for illustration purpose.

The second paper by Ki-Young Jeong, Lei Wu and Jae-Dong Hong provide an IDEF method-based integrated framework for a business process simulation model to reduce the model development time by increasing the communication and knowledge reusability during a simulation project. In this framework, simulation requirements are collected by a function modeling method (IDEF0) and a process modeling method (IDEF3).

The paper by by Yee Ming Chen and Bo-Yuan Wang is focused on Vehicle-based interactive management with multi-agent approach. They use virtual data as the input of simulation system and analyze the simulation result. Results show the average waiting time and the service rate (total transport passenger number / total passenger number). The performance measures can support to make management decisions.

The following paper by Sorabh Gupta deals with the opportunities for the modeling of flue gas and air system of a thermal power plant by making the performance evaluation using probabilistic approach. Data in feasible range are selected from a survey of thermal plant and the effect of each subsystem on the system availability is tabulated in the form of availability matrices, which provides various performance/availability levels for different combinations of failure and repair rates of all subsystems. Based upon various availability values obtained in availability matrices and graphs of failure/repair rates of different subsystems, performance and optimum values of failure/repair rates for maximum availability, of each subsystem is analyzed and then maintenance priorities are decided for all subsystems.

The last paper Sharad W. Mohod and Mohan V. Aware shows a simulation exercise of wind power with front-end converter into interconnected grid system. It presents a simulation set-up for wind turbine in MATLAB / SIMULINK, with front-end converter and interconnected system. The presented control scheme provides the wind power flow to the grid through a converter. The injected power in the system at the point of common coupling is ensured within the power quality norms.

JOSE L. SALMERON

Guest editor