Simulation and Analysis of Pharmacy Prescription and Vaccination Processes

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Abstract

Discrete Event Simulation (DES) modeling and analysis have become an increasingly popular tool amongst industrial engineering practitioners over the last few decades. DES has furthermore become an advanced tool in many major Lean Six Sigma studies and projects. The MSIE students at the University of New Haven are not only required to complete a full course in Simulation Modeling but also must complete a capstone project as a partial fulfillment of the MS degree in that course. To this end, the prescription filling and vaccination processes at a pharmacy in the New Haven, Connecticut area were studied and simulated using ARENA® from Rockwell Software Corp. The simulation model was also animated for a more realistic visualization of the said processes. After verification and validation of the simulation, the model was run for a standard shift to produce data to compare with the live system. The model produced a relatively long average waiting time in the queue and average queue length for both services, comparable to the live system. To maintain the system cost unchanged, recommendations were made to rearrange resources (staff) schedules, to increase resource availability during the peak hours on weekdays and weekends to reduce the average waiting time and average queue length. A future modeling exercise would need to investigate simulation models with added resources that include cost component consideration.

Keywords
Pharmacy Simulation, Process Optimization, Arena Modeling, Resource Allocation, Queue Management.

Biographies
Victhoria De Castro Lima is a graduate student in the Department of Industrial Engineering at the University of New Haven, West Haven, CT, USA. She holds a Bachelor of Science in Chemical Engineering and is a certified Six Sigma Green Belt. Her research interests include process optimization, supply chain management, and systems simulation. She has previous experience as a Quality Assurance Analyst and Manufacturing Engineer Intern, where she applied data-driven methodologies to enhance operational efficiencies.

Dr. M Ali Montazer earned the BSIE, MSIE, and the Ph.D. degrees from the University at Buffalo. He began his academic career at the University of New Haven in September 1984 and is now Professor of Industrial Engineering and Engineering Management. Dr. Montazer was honored with the Excellence in Teaching Award in 1987. After several years of full-time teaching and research, he served as program coordinator for the MSIE and MSEOM, department chair, Associate dean, and interim dean of the college prior to returning to the faculty and fulltime teaching in January 2016. He loves teaching and working with motivated and inquisitive students to work on application-oriented projects, especially those coming from and sponsored by local industry. Over the years, he has worked with students on projects sponsored by Hershey Metal, Sikorsky Aircraft, Asa Abloy-Sargent, Cheese-borough Ponds (Unilever), Remington, US Surgical (Medtronic), Valley Tools and Manufacturing, He has published in various reputable journals and conference proceedings. He is a senior member if IISE, IEOM, a member of ManufactureCT, and a former member of ASEE and POMS. He is interested in probability and simulation modelling, Job design and process improvement strategies, including Six Sigma and quality systems.