

Healthcare Operations Improvement Using Data Analytics, Simulation, and Value Stream Mapping

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Abstract

In this paper, we use data analysis, simulation and value stream mapping to consider a scheduling problem at Health Systems Hospital. The scheduling problem consists of discerning whether or not the hospital should overbook their patient load. We start by analyzing the scheduling data from the department. This includes data from Hospitals in the state of Michigan. The types of scans offered include; mammography, computed tomography (CT), Positron emission topography (PET) scans, Interventional radiology, Magnetic Resonance Imaging (MRI), and Nuclear Medicine. The data includes patients who were either; no show, completed, confirmed, and left without seen. We used the simulation software, Arena, and were able to set up a simulation model. This allowed us to use the data analysis and test different scenarios of what could potentially happen during the scheduling process. Value stream mapping gave us a step by step process of how a patient would ultimately schedule and receive a scan. Data analysis, simulation model, and value stream mapping were essential in our process to solve the hospital's problem. The goal of this paper is to improve scheduling and to see whether or not the hospital should overbook their appointments due to the high number of no-show patients.

Biographies

Lauren Wasiak is an undergraduate student at Bachelor of Science in Industrial Engineering at A. Leon Linton Department of Mechanical, Robotics and Industrial Engineering at the Lawrence Technological University, Southfield, Michigan, USA.

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Ahad Ali is an Associate Professor and Director of Industrial Engineering Program and Director of Smart Manufacturing and Lean Systems Research Group, A. Leon Linton Department of Mechanical, Robotics and Industrial Engineering at the Lawrence Technological University, Southfield, Michigan, USA. He earned B.S. in Mechanical Engineering from Khulna University of Engineering and Technology, Bangladesh, Masters in Systems and Engineering Management from Nanyang Technological University, Singapore and Ph.D. in Industrial Engineering from University of Wisconsin-Milwaukee. Dr. Ali was Assistant Professor in Industrial Engineering at the University of Puerto Rico - Mayaguez, Visiting Assistant Professor in Mechanical, Industrial and Manufacturing Engineering at the University of Toledo and Lecturer in Mechanical Engineering at the Bangladesh Institute of Technology, Khulna. He received an Outstanding Professor Award of the Industrial Engineering Department, University of Puerto Rico -Mayaguez, (2006-2007). He has published 50 journal and 121 conference papers. Dr Ali has conducted research projects with Chrysler, Ford, DTE Energy, New Center Stamping, Whelan Co., Delphi Automotive System, GE Medical Systems, Harley-Davidson Motor Company, International Truck and Engine Corporation (ITEC), National/Panasonic Electronics, and Rockwell Automation. His research interests include manufacturing systems modeling, simulation and optimization, intelligent scheduling and planning, artificial intelligence, predictive maintenance, e-manufacturing, and lean manufacturing. He has successfully advised seven doctoral students. Dr. Ali has involved with many international conference committees. He is serving as an Executive

Director of IEOM Society International and Conference Co-Chair of the International Conference on Industrial Engineering and Operations Management and hold events in Dhaka, Kuala Lumpur, Istanbul, Bali, Dubai, Orlando, Detroit, Rabat, UK, Bogota, Paris, Washington, DC, Pretoria, Bangkok, Pilsen, Toronto, Costa Rica, Sao Paulo and Riyadh. Dr. Ali has visited 20 countries for professional events. He is a member of IEOM, INFORMS, SME and IEEE.