

Lu He, Ph.D.

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EDUCATION

Ph.D., Industrial and Systems Engineering

Jan. 2016 – Dec. 2020

State University of New York at Binghamton, Binghamton, NY

GPA: 4.00/4.00

Dissertation Title: Optimization of Inpatient Bed Management Considering Patient Flow and Length of Stay Prediction

Advisor: Dr. Mohammad T. Khasawneh, Professor and Chair, Systems Science and Industrial Engineering

M.S., Industrial and Systems Engineering

Aug. 2014 - Dec. 2015

State University of New York at Binghamton, Binghamton, NY

GPA: 3.94/4.00

Thesis Title: Mixed Integer Programming Based Approach to a Prioritized Surgery Scheduling Problem

Advisor: Dr. Chun-An Chou, Assistant Professor, Systems Science and Industrial Engineering

B.M., Logistics Management

Aug. 2010 - Jun. 2014

Southeast University, Nanjing, China

GPA: 3.60/4.00

Thesis Title: Study on Hospital Emergency Surgical Scheduling Based on Disruption Management

Advisor: Dr. Lindu Zhao, Professor, Economics and Management

RESEARCH INTERESTS

Applications: Healthcare operations management, hospital process improvement, resource optimization, process mining on inpatient care pathway, clinical decision support, humanitarian logistics

Methodologies: Multi-task learning; mixed integer programming; data analytics; ensembled machine learning; scheduling theory, Markov chain modeling, simulation modeling; process mining

PROFESSIONAL EXPERIENCE

Instructor, Department of Marketing, Quantitative Analysis & Business Law, **Mississippi State University**

Jun. 2021 – Present

Course	Number of Semester Taught	Average Enrollment Per Semester	Average Evaluation
BQA 4423/6423: Business Decision Analysis	2	13	3.2
BQA 6423 Business Decision Analysis (Online)	4	31	3.5
BQA 8443: Statistical Analysis and Business Decisions (Online)	3	32	3.5
MKT 3323: International Logistics (Online)	6	42	3.6
MKT 4333: International Supply Chain Management (Community Engaged Class)	4	43	3.0

Adjunct Assistant Professor, Fay W. Boozman College of Public Health Department, **University of Arkansas of Medical Science** *Feb. 2021 – Jun. 2021*

- Taught the course: **Data Mining in Healthcare** through a combination of lectures and R language labs/projects. The lecture covers statistical analysis, statistical computing, and machine learning.
 - HPMT 5335: Data Mining in Healthcare, Enrollment: 20, Evaluation: 4.0/5.0
- Supported COVID-19 related research on hospitalization data. Did descriptive analysis and built predictive models to predict inpatient length of stay.

Research Associate, Department of Strategic Operations and Implementation, **Mount Sinai Health System** *Mar. 2017 - Jul. 2019*

- Collaborated with system-wide healthcare departments among 7 hospital campuses to assess their current processes using **Lean Six Sigma**, further identify opportunities in reducing non-value-added activities, optimizing staffing and appointment scheduling, and analyzing monthly performance reports.
- Cleaned and extracted useful clinical data from electronic healthcare record systems using **Excel**, **Minitab** and **Python**.
- **Used staff analyses, utilization analyses, hypotheses testing, etc. to make preliminary analyses.**
- Devised **optimization tools (Excel Solver)** and **simulation models (Simio)** to enhance scheduling accuracy and process efficiencies for the pediatric department and labor and productivity department.
- Developed **reports/dashboards (Excel/Access)** to track clinic performance based on agreed measurement metrics and cadence for cancer center with an average annual patient volume of 108,000, emergency department, and internal medicine association.

Lean Six Sigma Program Teaching Assistant, Department of Industrial and Systems Engineering, **the State University of New York at Binghamton** *Jan. 2016 - May. 2017, Jul. 2019 – Dec. 2020*

- Facilitated and maintained 20 Lean Six Sigma Yellow Belt, Green Belt, and Black Belt programs for both industries and academic organizations. The program sizes range from 9 to 152.
- Other responsibilities:
 - Prepared lecture materials, question banks, homework, and exams.
 - Facilitated all class related activities, including discussions and networking.
 - Assisted participants to understand course contents and concepts with virtual and face to face office hours. The average student evaluation for 4 years' service is 4.5/5.

Graduate Assistant, Strategic Partnership for Industrial Resurgence Project, **State University of New York at Binghamton** *Aug. 2015 - Dec. 2015*

- **Project topic:** Population-based Prediction Framework to Support Readmission Hospitalization and Prevention.
- Cleaned imbalanced MIMIC-II database (three hundred million data lines with 32,535 patient records) using a **sampling approach**.
- Improved overall ICU **readmission prediction** accuracy by 20% using the proposed **ensemble classification algorithm** compared to the **logistic regression model**.
- Identified key risk factors using **LASSO** and **decision tree** for heart failure, hypertension, etc. to support further intervention suggestions.
- Developed a **user-friendly interface** using **Matlab** to expose the constructed algorithm.

Data Analyst, **Annto Logistics Co., Ltd.** *Aug. 2012 - Sept. 2012*

- Responsible for correcting incorrect order estimates, and tracking components of orders in regions of Guangdong and Shanghai.

- Trained in the information center for order input, estimation, tracking, and monitoring.
- Trained teammates to better understand the use of Excel formulations.

Undergraduate Assistant, Students Research Training Program, Southeast University

Apr. 2012 - Nov. 2012

- **Project topic:** Exploration and Improvement of Reverse Logistics Standard Operation Process (SOP) Based on E-Commerce Platform.
- Performed a survey aiming at problems related to customers and couriers in the reverse return process of domestic and international express companies.
- Optimized SOP and put forwarded SOP widely used in the industry.

Undergraduate Assistant, Students Research Training Program, Southeast University

Sept. 2011 - Oct. 2012

- **Project topic:** Collaborative Optimization and Panel Design of Supply Chain under the Impact of Food Safety Affair.
- Studied reasons from an angle of the food supply chain and discussed the impact of that risk in the Nanjing Agricultural Product Logistics Center.
- Built a multilevel food supply chain collaborative dynamic optimization model with a redundant network and raised the corresponding optimization method.

GUEST LECTURER

Guest lecturer: Scheduling Optimization in Healthcare, Department of Management Science and Engineering, Southeast University, Nanjing, China *Dec. 2019*

Guest lecturer for graduate course SSIE 637 Advanced Topics in Health System, State University of New York at Binghamton *Oct. 2015*

SIGNIFICANT RESEARCH PROJECTS

Modeling and Analysis of Colonoscopy Screening Process Using Markov Chain Model

Aug. 2016 - Dec. 2016

- Developed a continuous **Markov chain model** for colonoscopy screening processes.
- Identified process bottlenecks during patient check-in and risk assessment room according to system **utilization analyses** through the built model.
- Performed numerical experiments following the concept of **design of experiments (DOE)** and concluded process improvement suggestions.

Optimization in Pharmaceutical Supply Chain Inventory Management for Disaster Planning

Aug. 2016 - Dec. 2016

- Proposed and solved two **nonlinear mixed-integer programming** models for inventory decision support in the pharmaceutical supply chains to minimize the overall inventory cost and the daily number of refills.
- Considered uncertainty customer demands, various medication types, natural disaster factors in the demands and refill cost, inventory capacity, etc. to make the model closer to real-world cases.
- Concluded the influence of disasters probability and drug demands have a larger impact on re-ordering frequency and quantity than customer service level.

Collaborative Aircraft Sequencing Optimization on Crossed-runways Using Mixed Integer Programming

Aug. 2015 - Dec. 2015

- Built a **mixed-integer programming** model for collaborative aircraft sequencing problem on crossed-runway according to LaGuardia Airport layout.

- Solved the proposed model using both exact solution (**CPLEX**) and **harmony search algorithm**.
- Investigated a case study and the proposed model reduced total delay loss by 91% compared to the first-come-first-served sequencing rule.

Call Center Decision Support System Design Using Discrete Event Simulation

Aug. 2015 - Dec. 2015

- Observed processes and collected three months of data with an average monthly call of 23,282 from a call center at the Universal Health Services (UHS) hospital in Binghamton.
- Restructured the call center **process map** and developed a **discrete event simulation** model.
- Built a user-friendly decision support system (DSS) to provide key performance indicators (KPI) using **VBA** which resulted that over 98% of the call demands can be served with 9 call stations staffed on a weekly average.

PROFESSIONAL SERVICES AND ACTIVITIES

Host Committee for 2023 IISE Annual Conference	<i>Aug. 2022- Present</i>
Track Chair of Health Systems for 2023 IISE Annual Conference	<i>Sept. 2023 - Present</i>
Invited reviewer for Socio-Economic Planning Sciences	<i>January 2023- present</i>
Invited reviewer for Healthcare Analytics	<i>December 2022- present</i>
Women Impacting Supply Chain Excellence (WISE) Future Leader Symposium	<i>Oct. 2022</i>
Facilitator of WISE dinner in Mississippi State University	<i>Apr. 2022</i>
2022 IISE DAIS track Best Student Paper competition Reviewer (Invited)	<i>Feb. 2022</i>
Session Chair for Flash Session V (TE75) in INFORMS 2019 Annual Meeting	<i>Oct. 2019</i>
Exhibitor for Binghamton University at China Education Expo (CEE) 2017	<i>Oct. 2017</i>
Volunteer for the 4 th Annual HILNNY Conference	<i>Oct. 2017</i>
Session Chair for Production Planning & Scheduling Track in ISERC	<i>May 2016</i>
Exchange Program at RWTH Aachen University in Germany	<i>Jun. 2012 - Jul. 2012</i>

Membership

- Institute of Industrial and System Engineers (IISE)
- Institute for Operations Research and the Management Sciences (INFORMS)
- Alpha Pi Mu

Ad Hoc Reviewer

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| • IEEE Access | • Journal of Nursing Management |
| • Applied Soft Computing | • Operations Research for Health Care |
| • Production Planning & Control | • European Journal of Operational Research |
| • Applied Mathematical Modelling | • Journal of the Operational Research Society |
| • Expert Systems with Applications | • Human Factors and Ergonomics in Manufacturing & Service Industries |

PUBLICATIONS

JOURNALS

1. Chorney, W., Wang, H., **He, L.**, Lee, S., & Fan, L. W. (2023). Convolutional block attention autoencoder for denoising electrocardiograms. *Biomedical Signal Processing and Control*, 86, 105242.
2. Ahmed, A., **He, L.**, Chou, C. A., Firouz, M., & Hamasha, M. M. A prediction-optimization approach to

- surgery prioritization in operating room scheduling. **Journal of Industrial and Production Engineering**, 1-15, 2021.
3. **He, L.**, Madathil, S. C., Servis, G., & Khasawneh, M. T. Neural network-based multi-task learning for inpatient flow classification and length of stay prediction. **Applied Soft Computing**, 108, 107483, 2021.
 4. **He, L.**, Madathil, S. C., Oberoi, A., Servis, G., & Khasawneh, M. T., A systematic review of research design and modeling techniques in inpatient bed management, **Computers & Industrial Engineering**, 127, 451-466, 2019.
 5. Rahman, A., **He, L.**, Wang, H. Activation Function Optimization Scheme for Image Classification. *IEEE Transactions on Neural Networks and Learning Systems* (under second round review).
 6. **He, L.**, & Khasawneh, M. T. Optimization of systematic inpatient bed management and flow control considering progressive care. *Production and Operations Management* (under review).

WORKING IN PROGRESS

7. **He, L.** A comparison of tree-based and neural network-based multi-task learning for inpatient care forecasting. [preparing for submission to *Decision Science*].
8. **He, L.** Daily inpatient bed allocation considering emergency room occupancy variation using goal programming. [preparing for submission to *European Journal of Operational Research*].
9. **He, L.** Real time ICU readmission risk analysis considering medical intervention influences. [preparing for submission to *Journal of Health Care Management*].
10. **He, L.** Order picking system: Integrated system considering storage and travelling efficiency. [preparing for *Decision Support Systems*].
11. Rezaeiahari, M., **He, L.** Stratified predictive modeling on ICU patient length of stay

CONFERENCE PAPERS

1. **He, L.**, Wang, H., Rezaeiahari, M. & Chou, C., An Embedded Machine Learning Model for Early Detection and Intervention of High-Risk Intensive Care Unit Readmission Patients, 2022 IEEE International Conference on Bioinformatics and Biomedicine (BIBM 2022).
2. **He, L.**, Kweon, S. Y., Madathil, S. C., & Khasawneh, M. T., Redesigning Scheduling Templates to Improve Patient Wait Time and Access in a Pediatric Outpatient Clinic, *Proceedings of the 2019 Industrial and Systems Engineering Research*, Orlando, May 18 - 21, 2019.
3. **He, L.**, Li, Y., & Chung, S. H., Modeling and Analysis of Colonoscopy Screening Process Using Markov Chain Model, *Proceedings of the 2017 Industrial and Systems Engineering Research*, Pittsburgh, May 20 - 23, 2017.
4. **He, L.**, Cuevas, J. T., Kokash, M. Z., Banimustafa, E. A., & Khasawneh, M. T., Optimization in Pharmaceutical Supply Chain Inventory Management for Disaster Planning, *Proceedings of the 2017 Industrial and Systems Engineering Research*, Pittsburgh, May 20 - 23, 2017.
5. Kohtz, S., **He, L.**, Najjar, W. A., & Alghoul T., Crime Patterns in Chicago Using Agent-Based Modeling, *Proceedings of the 2017 Industrial and Systems Engineering Research*, Pittsburgh, May 20 - 23, 2017.
6. **He, L.**, Wang, H., & Chou, C. A., A Two-Stage Priority Based Surgery Scheduling Method Considering Operating Room Specialties, *Proceedings of the 2016 Industrial and Systems Engineering Research*, Anaheim, California, May 21 - 24, 2016.
7. **He, L.**, Yoon, S. W., & Chou, C. A., Collaborative Aircraft Sequencing Optimization on Crossed-runways using Mixed Integer Programming, *Proceedings of the 2016 Industrial and Systems Engineering Research*, Anaheim, California, May 21 - 24, 2016.
8. Tutun, S., Khanmohammadi, S., **He, L.**, & Chou, C. A., A Meta-heuristic LASSO Model for Diabetic Readmission Prediction, *Proceedings of the 2016 Industrial and Systems Engineering Research*, Anaheim, California, May 21 - 24, 2016.
9. Zhu, Z., Jiang, C., Chen, J., **He, L.**, Wu, Q., & Wang, X., Design of a Wearable Lower Limb Exoskeleton for Paralyzed Individuals, *Mechatronics and Machine Vision in Practice*, 2016. M2VIP 2016. 23rd International Conference on. IEEE, Nanjing, China, Nov. 28 - 30, 2016.

CONFERENCE POSTERS AND PRESENTATIONS

1. **He, L.**, Outpatient Scheduling Template Optimization in a Pediatric Clinic, The Mississippi Academy of Sciences 85th Annual Meeting, Biloxi, August 5 – August 6, 2021. (Presentation)
2. **He, L.**, Madathil, S. C., & Khasawneh, M. T., Inpatient Bed Assignment Optimization Considering Holistic Inpatient Flow, Proceedings of the 2020 Industrial and Systems Engineering Research, Virtual, November 1 - 3, 2020. (Presentation)
3. **He, L.**, Madathil, S. C., Oberoi, A., & Khasawneh, M. T., Priority Based Inpatient Bed Resource Optimization Model, Proceedings of the 2018 Industrial and Systems Engineering Research, Orlando, May 19 - 22, 2019. (Poster)
4. Nevin K., Cotilletta B., **He, L.**, An ICU throughput improvement case study using Six Sigma DMAIC methods, Proceedings of the 2019 Healthcare Systems Process Improvement, San Antonio, February 20 - 22, 2019. (Presentation)
5. Najjar, R., **He, L.**, Oberoi, A., Simulation-Based Decision Support Tool in a Maternal Child Health Setting, Proceedings of the 2019 Industrial and Systems Engineering Research, Orlando, May 18 - 21, 2019. (Presentation)
6. **He, L.**, Madathil, S. C., & Khasawneh, M. T., Inpatient Bed Management Optimization Considering Patient Flow, 2019 Informs Annual Meeting, Seattle, October 20 – 23, 2019. (Presentation)

COMPUTER SKILLS

Programming Languages:	Python, MATLAB, R, C, VBA
Statistical Analysis:	Pandas, sci-kit-learn, Keras, Pivot Table, Excel Data Analysis Tools, Excel Solver, Tableau, Minitab, SAS, SPSS
Engineering Applications:	CPLEX, Weka, Julia, Simio, Arena, MySQL, Access
General Applications:	MS Office, Visio, LaTeX, Atom, Slack

CERTIFICATIONS

Online Teaching 101	Sept. 2021
Lean Six Sigma Black Belt Certifications	Mar. 2018
Simio Online Learning Series: Level 2 Certification	Mar. 2018

HONORS

Mississippi State University	Starkville, MS
The 2022-2023 Community-Engaged Learning Faculty Fellowship	May 2022
The State University of New York at Binghamton	Binghamton, NY
SSIE Graduate Service to Department in Industrial and Systems Engineering Award	May 2021
Institute of Industrial and System Engineers	
2 nd Prize of 4 th Annual IIE-CIS Mobile App Competition	May 2016
Session Chair for Production Planning & Scheduling Track in ISERC	May 2016
Southeast University	Nanjing, China
Certifications of Oral Presentation at “4 th Modern Logistics Management Workshop”	Jun. 2013
Jinling Logistics Scholarship Awarded by Southeast University	Dec. 2012
2 nd Prize of “Anji Cup” 4 th National University and College Student Logistics Design Competition	Mar. 2013
2 nd Prize of “Jinweining Cup” 2 nd Nanjing Universities “Logistics and Supply Chain” Innovation Competition	Dec. 2012
Excellence Award of Social Work by Southeast University	Nov. 2011
2 nd Prize of 4 th Annual IIE-CIS Mobile App Competition	May 2016