7th Bangladesh Conference on Industrial Engineering and Operations Management
December 21-22, 2024
Publisher: IEOM Society International, USA DOI: 10.46254/BA07.20240096
Published: December 21, 2024

Performance Analysis of Supply Chain Resilience Using AI-Driven Predictive and Adaptive Modeling

Mahadi Hasan Rabbi
Department of Industrial and Production Engineering
Jashore University of Science and Technology
Jashore, Bangladesh
mehedibelleame@gmail.com

Mashrur Ibne Shams
Department of Industrial and Production Engineering
Jashore University of Science and Technology
Jashore, Bangladesh
masrurplabon111@gmail.com

Dr. Shakhawat Hossain
Assistant Professor
Department of Industrial and Production Engineering
Jashore University of Science and Technology
Jashore, Bangladesh
shakhawat.ipe@just.edu.bd

Dr. Md Mahafuzur Rahman
Assistant Professor
Department of Industrial and Production Engineering
Jashore University of Science and Technology
Jashore, Bangladesh
mrahman.ipe@just.edu.bd

Abstract

This study investigates the pivotal function of Artificial Intelligence (AI) in bolstering supply chain resilience by forecasting and addressing disruptions via predictive analytics, real-time monitoring, and data-informed decision-making. In the current dynamic and integrated global economy, supply chain resilience is essential, as disruptions present considerable hazards to operational stability. The study begins with predictive analytics to determine existing risks and model possible disruptions. Artificial intelligence methodologies, including machine learning and reinforcement learning, are used to predict demand variations and improve decision-making procedures. A discrete event simulation model, created with Python, precisely represents the supply chain's performance without impacting real-time operations. The simulation model is evaluated and executed across 40 replications to guarantee reliability. Four AI-augmented resilience strategies are evaluated using AnyLogic simulation software, revealing that the optimal

solution yields significant enhancements, including a 35% decrease in response time, an increase in forecast accuracy from 72% to 90%, and an enhancement in resource utilization from 68% to 84%.

Keywords
Supply chain resilience, Artificial Intelligence, predictive analytics, machine learning and demand forecasting.

Biographies
Mehedi Hasan Rabbi is a final-year undergraduate student in the Department of Industrial and Production Engineering at Jashore University of Science and Technology, Bangladesh. I hold a Certified Supply Chain Analyst (CSCA) certification, which has enhanced my expertise in supply chain management and logistics. My academic and research interests focus on optimization, supply chain management, and the application of advanced technologies like Artificial Intelligence and Machine Learning in industrial systems

Mashrur Ibne Shams is a final-year undergraduate student in the Department of Industrial and Production Engineering at Jashore University of Science and Technology, Bangladesh. I hold a Certified Supply Chain Analyst (CSCA) certification, which has enhanced my expertise in supply chain management and logistics. My academic and research interests focus on optimization, supply chain management, and the application of advanced technologies like Artificial Intelligence and Machine Learning in industrial systems

Dr. Shakhawat Hossain received his B.Sc in mechanical engineering from Chittagong University of Engineering and Technology (CUET), in 2007, M.Sc in mechanical engineering from Inha University, Incheon-South Korea, in 2010, and Ph.D. degree from Inha University, in 2018 Feb.He joined in Sejong University (March 2018) Seoul-South korea, as an assistant professor under the department of Unmanned Vehicle Engineering and served till Sep. 2019. He joined Jashore University of Science and Technology as Assistant Professor, Department of Industrial and Production Engineering in Oct, 2019 and has been working here since then.

Dr. Md Mahfuzur Rahman a B.Sc. in Industrial and Production Engineering from the Bangladesh University of Engineering and Technology (BUET) in 2008, followed by an M.Sc. in Materials Science and Engineering (2011–2013) and a Ph.D. in Interdisciplinary Engineering (2013–2017), both from the Masdar Institute of Science and Technology (Khalifa University). Professionally, Dr. X began as a Lean Executive at VIYELLATEX Group Ltd, Gazipur, Bangladesh (2008–2009), before transitioning to academia. He served as an Assistant Professor at the National Institute of Textile Engineering and Research (NITER), Savar, Dhaka (2017–2018), and the Military Institute of Science and Technology (MIST), Mirpur Cantonment, Dhaka (2018–2019). Since October 2019, he has been working as an Assistant Professor at Jashore University of Science and Technology (JUST), Jashore.