

Improving Disaster Relief Supply Chain Efficiency in Bangladesh

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Abstract

Bangladesh is one of the most disaster-prone countries globally, frequently affected by floods, cyclones, and landslides that severely disrupt humanitarian response operations. An efficient disaster relief supply chain is critical to ensure timely distribution of food, medicine, and shelter to affected communities. However, current practices often face bottlenecks such as poor coordination among stakeholders, inadequate pre-positioned warehouses, lack of real-time information, and transportation breakdowns during emergencies. These gaps result in delayed delivery and uneven distribution of relief materials. This paper investigates the challenges of the disaster relief supply chain in Bangladesh and proposes a framework to improve its efficiency. The study emphasizes three key strategies: (1) establishing decentralized and pre-positioned regional warehouses in disaster-prone areas to reduce lead time, (2) implementing digital tracking and mobile-based information systems for real-time monitoring of relief distribution, and (3) applying route optimization techniques to identify alternative transport networks when primary routes fail. A hypothetical case analysis of the Sylhet flood scenario demonstrates that pre-positioning warehouses near vulnerable zones could reduce average delivery time significantly, minimizing the degree of loss that is common in such cases. The findings highlight that adopting industrial engineering and operations management approaches can significantly enhance the effectiveness of humanitarian logistics in Bangladesh, ensuring faster, fairer, and more reliable relief distribution during disasters.

Keywords

Disaster Relief, Efficiency, Supply Chain, Real-time monitoring.

Biographies

Md. Mahdi Islam is pursuing his Bachelor's degree in Mechanical and Production Engineering (MPE) at Ahsanullah University of Science and Technology (AUST). His areas of interest include fluid mechanics, HVAC systems, and sustainable energy-efficient technologies. He has developed skills in engineering design, technical paper writing, and collaborative project development. In addition to his coursework, he has been involved in academic research documentation, prototype design, and drafting technical manuscripts. He has participated in design-focused academic projects and workshops, further enhancing his technical and analytical abilities. His dedication to learning and applying design principles has enabled him to contribute effectively to team-based projects. He aims to integrate his technical expertise, design capability, and writing skills to develop innovative engineering solutions that serve both industry and society.

MD Emaul Islam is an undergraduate student in the Department of Mechanical and Production Engineering (MPE) at Ahsanullah University of Science and Technology (AUST). His research interests in Thermal energy, Composite Materials and the application of robotic technologies in agricultural sector. He has strong competencies in design, robotics, and mechanical system analysis, with practical experience in automation and prototype development. He has

also participated in projects related to Industrial Heat and Thermal conductivity, Robotics and Simulation of mechanical systems, where he applied engineering principles to real-world problem solving. Beyond academics he has good leadership and strong community skills, demonstrated teamwork and technical creativity in multidisciplinary projects. His academic and involvement in multifarious projects reflect his aspiration to contribute to the advancement of these related applications.