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An evaluation of the performance of a safe insulin supply chain through the AHP-TOPSIS model

Mona Haji
Logistics and Supply Chain Management Department
College of Science and Engineering
Hamad Bin Khalifa University
Doha, Qatar
mhaji@hbku.edu.qa

Abstract

Diabetes type 1 patients require insulin, a life-saving and essential medication, to maintain their blood sugar levels below dangerous levels, which allows them to live everyday life. There are significant issues with insulin supply and affordability in the industry, and as a result, patients and their families face an enormous burden. The high prices of insulin and the lack of availability have led many people to turn to other options for purchasing insulin, such as online pharmacies, which may or may not be legitimate due to their high prices and lack of availability. While diabetics need safe insulin in their legitimate Pharmaceutical Supply Chain (PSC), few researchers have considered implementing strategies to maximize patient safety when buying insulin in the legitimate Pharmaceutical Supply Chain (PSC). This is why the current research is intended to bridge this gap and provide cohesive information on improving insulin safety through the process of overcoming this challenge. This study employs a Multi-Criteria Decision-Making (MCDM) model that combines Supply Chain Operations Reference (SCOR) metrics, Analytic Hierarchy Process (AHP), and Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) to develop a model that can prioritize and select the best criteria for maximizing insulin safety and achieving the study objective. There has been a comparison of two scenarios involving the insulin supply chain that has been carried out. As a result of this research, the integration of a traceability technology to the insulin supply chain, specifically blockchain (T42), in scenario 2 resulted in the best results for the supply chain for maximizing and ensuring the safety of insulin, as compared to scenario 1, where the final score was almost 71%. The research provided a valuable tool for assessing the safety of other critical goods that customers value in strategic and complex decision-making processes, enabling customers to make more informed decisions. Researchers, professionals, and decision-makers can benefit from the results of this research when they can use a rigorous scientific decision-support system to make informed decisions.

Keywords
Technology, anti-counterfeiting, counterfeiting, food, drugs

Biography / Biographies

Mona Haji is currently a PhD graduate of the Logistics and Supply Chain Management Program within the Engineering Management and Decision Sciences Division at the College of Science of Engineering (CSE), Hamad Bin Khalifa University (HBKU) in Doha, Qatar. Her field of interest is Logistics and Supply Chain Management. She published several papers in international journals addressed public health and how to ensure food quality and drug safety. In addition to her experience in materials and store management, she has also established maintenance contracts. She has a MSc in Engineering Management from the Science and Engineering Department, University of Qatar, and BSc in Mechanical Engineering from the Science and Engineering Department, University of Colorado at Denver, USA