

Project Title: Riding to Success in Cold Chain Digitalization: A Digital Twin based Closed-Loop Logistics Decision Model

研究項目: 邁向冷鏈數碼化: 基於數位孿生的閉環物流決策模型

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Abstract

Due to the rapidly growing demand for reliable and high-quality cold chain logistics following the global pandemic, increasing concern has led to the development of a robust and comprehensive cold chain logistics system, in order to meet designated handling requirements and specifications. Different from general logistics services, time-temperature-sensitive products, such as pharmaceuticals and life sciences products, need to be refrigerated at extremely low temperatures during transportation and distributed within a short time period within the cold chain. Concerning the strict handling requirement of such time-temperature-sensitive products, appropriate cold chain packaging methods, monitoring devices and shipment routes must be specially designed by the Cold Chain Logistics Service Providers. Currently, most of the passive packaging materials and monitoring devices are designed for one-time consumption, such that the cost of reverse logistics in the supply chain network, can be eliminated. However, after receiving the pharmaceuticals and life science products, the downstream supply chain partners would simply dispose of the packaging materials. This results in poor sustainable development regarding cold chain logistics. Consequently, a certain amount of solid waste is created each time goods are received, with a significant environmental impact on society. Hence, this research proposes a digital twin-based closed-loop logistics decision model for handling time-temperature-sensitive shipments. The result of this project will reshape the cold chain in the digital age, benefit society in terms of sustainability and environmental impact and hence contribute to cold chain logistics development in Hong Kong.

