

Design of Marine Port Logistics Resilience System in Archipelago Countries Face of Industry 4.0 Era

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摘要

作為世界上最大的群島國家之一，印度尼西亞近年來一直在推行海洋公路系統。本研究針對海洋公路計劃中依然存在的問題試著提出一些解決方案，如營運效率低下所造成的跨國物流成本太高或處理時間過長等等。此外，每個港口的運營系統依據所在自治區有許多獨特規範，造成海上公路計劃實施上的困難。本研究的目的是優化港口服務，特別是針對群島國家，使其在工業 4.0 時代更加具有效率與效能。我們的第一步是使用 AHP 方法收集和分析每個變量，以找出每個航運公司和客戶產品公司面臨的關鍵問題，通過評估結果和層次分析法衡量每個變量的優先等級；第二階段是採用 QFD 方法來設計一個海港的彈性應變系統，以彙整所有利益關係方在面臨工業 4.0 時代衍生相關利益下的考量與意見。研究結果顯示，工業 4.0 時代的海港彈性物流系統的前三個因素為先進的 IT 系統、供應鏈關係管理以及物流系統的監控和維護。此外，為使在海洋港口運營系統導入先進的 IT 系統，我們的研究提供了一個新的 IOT 框架，依據此框架設計出一套線上管理系統，每個使用者皆可以在透過手機上的應用程序連線。

Abstract

As one of the largest archipelagic countries in the world, Indonesia has been running the marine highway system in recent years. This study focuses on issues surrounding the marine highway program which still leaves problems such as inefficiencies in national logistics costs, high dwelling times, and others. Moreover, the implementation of the marine highway program is difficult due to the many unique rules of each autonomy region which regulates the port's operational system. The objective of this study is to optimize port services to be more effective and efficient in entering the industrial era 4.0 especially for archipelagic countries. Our first step was to collect and analyze each variable with the AHP approach, to find critical problems faced by each shipping liners and customer product company. Through the results of the assessment and synchronizing the priority level of each variable through AHP, the second stage is to design a marine port resilience system with a QFD approach so that all stakeholder representatives can provide suggestion according to their institutional interests related to industry 4.0 issues. The outcome, the top three factors of resilience measures of a marine ports logistics system that need to be optimized in industry 4.0 era are the advanced IT system, supply chain relationship management, and monitoring and maintenance of operational marine system. Furthermore, following up on the role of advanced IT systems for marine port operational systems, our study provides a newly IOT framework that is integrated with synchronize the entire administrative process of each port stakeholder across the region and finish it only in a mobile phone application.

Keywords: Marine Port, Resilience Measures, AHP, QFD, IOT