

# The Relative Efficiency of Container Terminals in Small and Medium-Sized Ports in China



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## Abstract

The promotion of domestic consumption in China will gradually ramp up the small and medium-sized port container industry, and this will require greater port efficiency and an updated development strategy. The aim of this paper is to evaluate operational and productivity efficiency change in 21 coastal small and medium sized-port container terminals in China. The first step was carried out using data envelopment analysis (DEA) and the Malmquist productivity index (MPI), and the factors affecting productivity efficiency change were then estimated and quantified using Tobit regression. The empirical results indicate that the most efficient terminals are the Rizhao and Lianyungang port terminals. Furthermore, the terminals that hold a share of more than 50% of Chinese state-owned shipping line show the highest increase in productivity efficiency change. Lastly, the results indicate manpower structure; Chinese state-owned shipping line shareholding; registered capital; and shipping routes have positive effect and the factor, number of terminal operators, have a negative correlation.

**Key Words :** Small and Medium-sized Port (SMP), Data Envelopment Analysis (DEA), Malmquist Productivity Index (MPI), Tobit Regression

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## **I. Introduction**

During the Chinese “two meeting” between the National People’s Congress and the Chinese People’s Political Consultative Conference, Premier Wen clearly stated in the “Government Work Report” that China should make a strong commitment to domestic demand expansion as its long-term strategy for economic development. The focus of economic growth in China should also shift from its current export and investment-led growth model to a consumption-based model. The domestic demand-led economic development model will not just change the economy but will also affect supply structures in China and promote the development of China’s domestic container shipping ports.

In the domestic trade container transportation business, the domestic trade waterway dispatching system cannot depend completely on big ports. The system needs small and medium-sized ports (SMPs) as feeder ports to supply large regional hub ports and therefore meet demands for multi-level port layouts. As a key element of China’s waterway transportation industry, SMPs play an important role in economic development, alleviate pressure on waterway transportation, and aid the development of port cities.

Many studies have already been done on port efficiency, most of which are based on hub ports or full ports in a region. However, few studies have investigated SMPs as a target for analyzing efficiency. This study aims to analyze port operation efficiency in China and focus on SMPs using the DEA and Tobit methods. Data regarding the relative operating efficiency of each SMP can be used to formulate suggestions regarding the improvement of port management and to assist departments in making decisions for enhancing the efficiency.

## **II. Literature Review**

### **1. Port Efficiency Evaluation Using DEA-Malmquist**

The DEA model is commonly used to examine the efficiency of ports and has been the subject of many research studies estimating port efficiency (Al-Eraqi et al., 2008; Khin and Yang, 2010; Wu and Goh, 2010; Hung et al.,

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