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Port Investment Strategies under Uncertainty: The Case of a Southeast Asian Multipurpose Port*

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Abstract

Port investment decisions are mainly related to productivity improvement strategies or capacity expansion leading to higher capacity utilization and financial performance. The authors propose an investment decision-making process for future port infrastructure investments taking into account various uncertainties, which can impact the return of the investment over the project's useful life.

The methodology has been applied on the expansion evaluation of warehousing facilities in a multipurpose port. For the evaluation of the alternatives, the expected net present value (ENPV) is based on earnings before interest, tax, depreciation and amortization (EBITDA). Results show that the investment strategy for a new 4-level warehouse with a flexible option was the optimal choice when compared with strategies of similar scale. However, depending on the emphasis placed on the various investment metrics the optimal investment strategy seems to be closer to a non-flexible 5-level warehouse.

Key Words : Port, Investment, Uncertainty, Decision-Making

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I. Introduction

A port system is a collection of components bridging land and sea that work together to handle the cargo, which arrives sea-side by vessel at anchorage, is transferred land-side to the port terminal at the port's berths, and is eventually transported by intermodal links (e.g. road or rail networks) to the population located in the hinterland demanding the goods. As economies develop and trade routes change, a port system's capacity may need to expand to accommodate future cargo volume demand. However, investment in port infrastructure requires large amounts of capital and these investment decisions must be made when facing various uncertainties over the long life of these assets.

The main motive behind this present research is to address a gap in the maritime literature, which relates to the evaluation of port investment projects. As presented in the literature review section, the majority of the works that were identified use traditional financial tools or are associated with efforts that provide information on the type of investments that have taken place in a maritime market or sector.

The aim of the research is to present an applied framework for prioritizing investment decisions by applying and modifying an existing methodology for assessing investment strategies under uncertainty. The framework consist of two process; (i) a methodology for measuring a port system's capacity, developed by Lagoudis and Rice and (ii) a methodology for evaluating different investment strategies under multiple scenarios developed by de Neufville and Scholtes[1]. The former framework enables the identification of the bottlenecks in the port system and the latter assists in the evaluation of the needed investments given the bottlenecks[2]. In the present work, emphasis is given on the elaboration and application of the investment evaluation techniques as the focus of the paper is on investment decision-making once a capacity bottleneck is identified. The reader can refer to studies of Lagoudis and Rice, and Salminen in order to follow the bottleneck identification process, which is composed of the first two steps of the methodology[3].

For this purpose, a case study port located in Southeast Asia is used,

1) Lagoudis and Rice(2011), de Neufville and Scholtes(2011)
2) Salminen(2013)
3) Lagoudis and Rice(2011); Salminen(2013)