



A Flexible Port Network by Adaptive Port Planning, a Case Study of the Ports of Isafjordur Network

Majid Eskafi¹, Gudmundur F. Ulfarsson², Ali Dastgheib³, Poonam Taneja⁴, Gunnar Stefansson⁵, Ragnheidur I. Thorarinsdottir⁶

¹ Faculty of Civil and Environmental Engineering, University of Iceland, mae47@hi.is

² Faculty of Civil and Environmental Engineering, University of Iceland, gfu@hi.is

³ Department of Coastal and Urban Risk and Resilience, IHE Delft Institute for Water Education, a.dastgheib@un-ihe.org

⁴ Faculty of Civil Engineering and Geosciences, Delft University of Technology, p.taneja@tudelft.nl

⁵ Faculty of Industrial Engineering, Mechanical Engineering, and Computer Science, University of Iceland, gunste@hi.is

⁶ Agricultural University of Iceland; Faculty of Civil and Environmental Engineering, University of Iceland, rith@hi.is

Abstract

Ports are complex engineering systems that have always been evolving to satisfy new demands on their layers. However, the dynamic and ever-increasing complex nature of a port system in the instability of the volatile world creates a high degree of uncertainty on port development plans.

Adaptive port planning delivers robust solutions by integrating uncertainty and flexibility into the planning process. This research project presents a framework to facilitate adaptive port planning for the Ports of Isafjordur Network (Hafnir Ísafjarðarbæjar), the first such project in Iceland.

The framework nonlinearity deals with uncertainty in the port planning process in order to move the plan towards its success in a projected lifetime. Furthermore, a rigorous forecast model is developed that accounts for uncertainties in the port throughput forecast.

The results show growth in aquaculture, cruise activities, and cargo flow, in particular, containerized cargo. This increase mainly presents opportunities in the short-time horizon, while in the middle-time horizon the Ports of Isafjordur network is confronted with multiple vulnerabilities.

This research project provides supports to decision makers and port authorities to choose a preferred course of action for timely and strategically implementing the plan in the face of uncertainty. Thus, they retain the competitive position of their port by meeting the objectives of stakeholders in the changing market environment.