

Flexible and Adaptive Port Planning

An Icelandic case of the Ports of Isafjordur Network

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Status for Grant year 2020

Port Throughput Forecast

An investment decision for port capacity development should be supported by growing demand. However, in a volatile and competitive market environment, demand is changing and uncertain. Forecasting models are also associated with epistemic uncertainty due to model and parameter uncertainties. A Bayesian statistical method and mutual information were used to develop a port throughput forecasting model that accounts for epistemic uncertainty. The model has an adaptive capability to provide a regularly updated throughput forecast. Figure 1 shows the development of the historic and the forecasted throughput of the Port of Isafjordur.

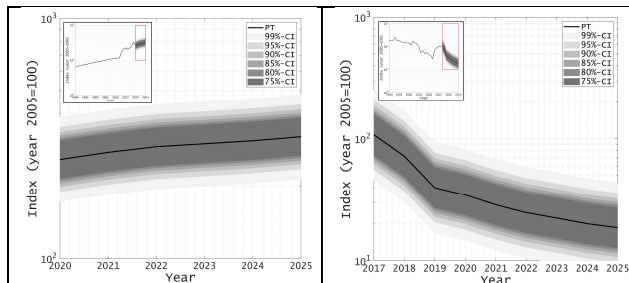


Figure 1. Historic and forecasted containerized (left) and non-containerized (right) Port Throughput (PT) developments, and Confidence Interval (CI).

Flexible and Sustainable Port

A flexible port can be adapted to a wide range of changes and thus prolongs the useful lifetime of port infrastructure and maintains the functionality of the port. Furthermore, accounting for four dimensions of sustainability (i.e., economic, social, environmental, and institutional) has become a high-profile objective of decision making in the port planning process. To develop a sustainable port, a balanced paradigm of economic, social, environmental, and institutional dimensions should be taken into account (Figure 2).

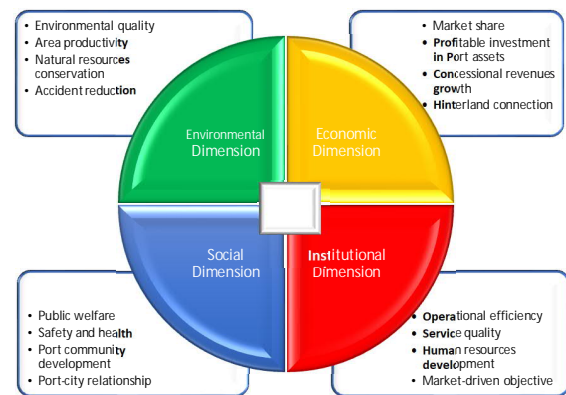


Figure 2. Dimensions of Sustainability

Contingency Plan

To safeguard the main port plan against departures from the pre-defined path toward its success, a contingency plan is developed. A contingency plan consists of effective actions including:

- Defensive action
- Capitalizing action
- Corrective action
- Reassessment action

Port Project Appraisal

Under uncertainty, the value of a plan is driven by the flexibility it provides for adaptation. Simulation methods are useful for port project appraisal as they include uncertainties and can evaluate flexibility. Furthermore, to assess the costs and benefits of flexibility and sustainability, multi-criteria analysis methods are suitable for the project appraisal.