The Flexible and Sustainable Port

Adaptive Planning of the Ports of Isafjordur Network

(Hafnir Ísafjarðarbæjar)

Post-Doctoral Research Proposal (2021)

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Table of Contents

Introduction

Ports are pivotal nodes in the multimodal transport system, where they function as a logistics center for the flow of containers, cargos, and passengers. Port are favorite locations for value-added activities (production and consumption) wherein several industries operate. They have prominent status in the supply chain and economy of countries.

A port is recognized as a complex set of functions in which multiple interactions between different components are possible. The complexity of a port system is engaged to unlimited geographic boundaries and trading network, long design lifetime, numerous stakeholders (with new and changing demand), and its intricacy with society, environment, and economy. The dynamic and ever-increasing complex nature of a port system in the instability of the volatile market environment creates a high degree of uncertainty on port development plans.

Indeed, in today's turbulent, breakthroughs in science and technology, hyper-competitive market, globalization, social and political changes, ports are confronted with many uncertainties about their futures. In testimony of uncertain circumstances, the outbreak of the Coronavirus disease (COVID-19) pandemic in 2020-21, is significantly affecting maritime sectors as cruise ship calls have slumped and there is a decline in cargo flows. The present uncertain situation in maritime sectors due to COVID-19 was never expected. Furthermore, an avalanche that strictly hit the Port of Flateyri in 2020 and caused major damage to boats and the port facilities, implies the importance of dealing with the uncertain and unpredictable future in the planning process. In addition, the fragile port sectors are faced with political and environmental uncertainties around fishing quotas, salmon industries, winter cruise calls, new shipping routes across the Arctic, gas and oil explorations around the region, etc.

The main reason for unsuccessful port development projects is inadequate uncertainty consideration in the planning process. Unsuccessful port projects may result in loss of investment, failure of the project, congestion in the port area or hinterland, redundancy and obsolescence of ports, or costly regular adaptations of the port layers including physical infrastructure, operation and management, and product and service. Besides, comes loss of competitive position, market share, cargo, and revenue during the period that the port cannot be used due to the adaptation. Unsuccessful port development projects limit room for sustainable expansion and creating synergy between port activities (e.g., Sundahöfn, Bíldudalshöfn, Landeyjarhöfn). Port infrastructure is indivisible and irreversible and has a long design lifetime with a long payback period. Planning needs a long-time view to ascertain the functionality of a port, otherwise, it is ineffective and uneconomical to change their configuration during the projected lifetime.

Flexibility in a port system creates a buffer to adapt rapidly and economically to the new and/or changing demands of stakeholders. The role of flexibility in port development is to be an effective solution to deal with a wide range of future conditions. As ports are evolving, their extended future use beyond their functional/technical lifetime significantly depends on their flexibility. Extensive investigation of **flexible port** development is found at the port of Rotterdam, the largest port in Europe, and classified as the best port infrastructure in the world according to the World Economic Forum in 'The Global Competitiveness Report 2016-2017.

Furthermore, the importance of sustainability and lifecycle considerations in port planning has increasingly been acknowledged. The main transitions in port meta trends are 1- a shift from **globalization to sustainability** and eventually the **quality of life**; and 2. a shift from the Information and Communications Technology (ICT) to the **Internet of Things** (IoT). So, the next 20 years are expected to be dominated by innovation and development in **sustainability and digital connectivity**. Accounting for four dimensions of sustainability (i.e., economic, social, environmental, and institutional) has become a high-profile objective of decision making in port planning processes. Well-known initiatives such as **sustainable ports**, **eco-ports**, and **green ports** have been developed by the European Sea Ports Organization (ESPO) or the World Association for Waterborne Infrastructure (PIANC) by considering “an economic green growth strategy”, “working with nature philosophy”, “corporate social responsibility”, and “stakeholder participation”. Increasing environmental awareness with strict regulations and sustainable operations face challenges for the development of green- and brown-field ports.

Icelandic ports are on the verge of a new era in maritime activities. Fishery management and growing interest in sustainable fish farming have affected the fishing vessel traffic. Also, vessel traffic has significantly been growing in ports all around the world due to world globalization and containerization. This growth has increased the number of port calls, and vessels’ size (increased by 1200% in 50 years). This sustained growth of containerized cargos has also been shown in Iceland. Growth in container/cargo volume and increasing focus on sustainability induce a modal shift towards a more environmentally friendly form of transport and logistics from the road to cabotage. Moreover, the cruise sector has become the fastest-growing and most-dynamic segment in the travel industry and tourism in the world. In North America and Europe, the cruise sector has been growing faster than other segments of the travel industry. This growth has affected cruise ship fleets with more itineraries, bigger vessel sizes, and is expected to continue for the next 10 to 20 years in Europe. Also, cruise companies are increasingly looking for new destinations and diversified itineraries to unvisited, smaller, less-well-known, and less-frequented ports of call (e.g., small Icelandic ports).

Study Area

The present research project is the final part of the ongoing "**Flexible and Sustainable Port Planning**" for the Ports of Isafjordur Network (Hafnir Ísafjarðarbæjar), **the first such project in Iceland**. The network includes four ports of the Port of Isafjordur (Ísafjarðarhöfn), the Port of Sudureyri (Suðureyrarhöfn), the Port of Flateyri (Flateyrarhöfn), and the Port of Thingeyri (Þingeyrarhöfn). The ports are dissimilar in size, function, geographical and navigational conditions (Figure 1). These differences influence development opportunities to service market-oriented and competition-driven port activities. The spatial distribution of the ports in the region gives a dominant and competitive position to the network. The national hinterland of the network encourages companies and industries to develop their commerce in and around the network.

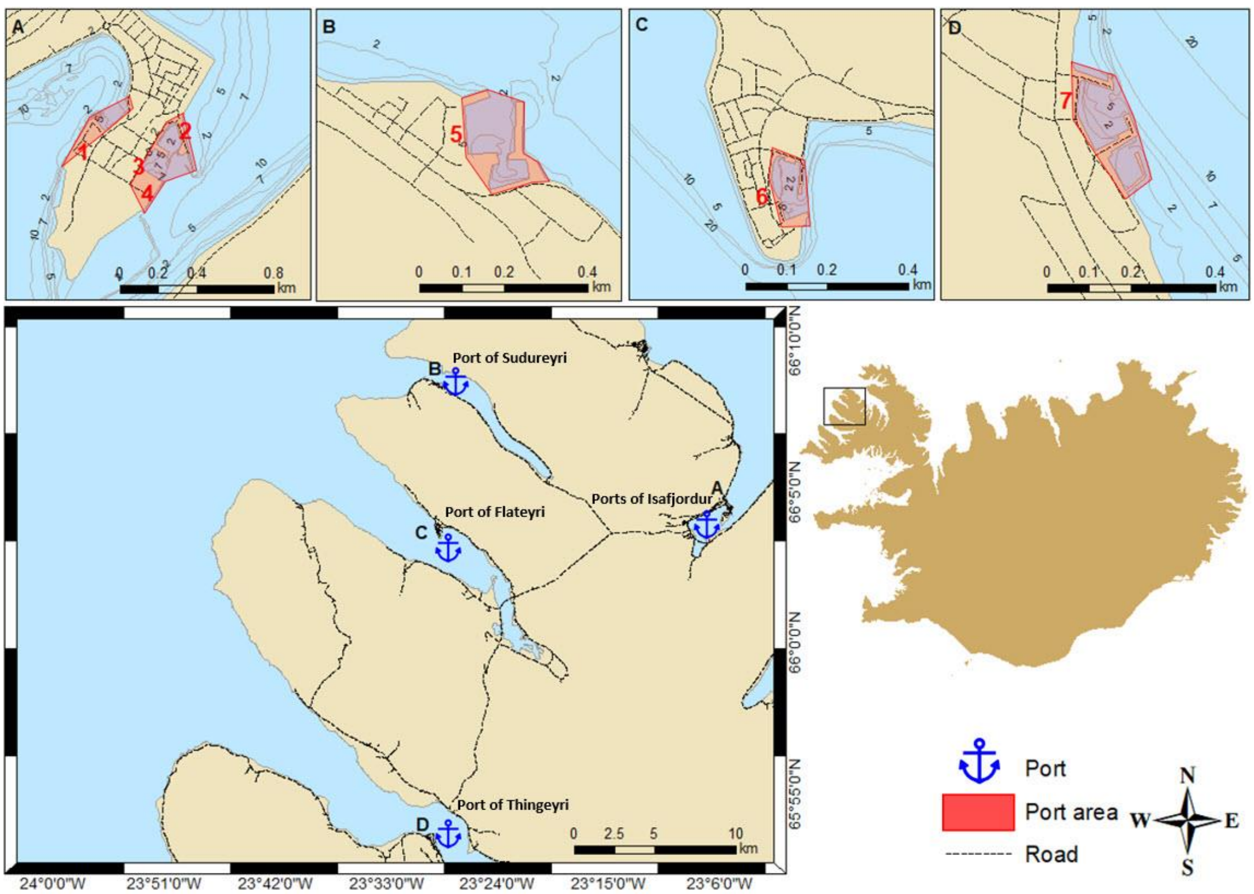

Figure 1. The location of the Ports of Isafjordur Network. The study area is shown on the map of Iceland. A, B, C, and D stand for the Ports of Isafjordur, Sudureyri, Flateyri, and Thingeyri, respectively. The numbers indicate the commonly used quays.

The network has a locational advantage in Iceland as it is close to a rich fishing ground in the North Atlantic Ocean. The core business of the network is related to fisheries and industrial aquaculture (i.e., fish, algae, mussel, calcified seaweed), and further production including processing and packing as well as industrial equipment manufacturing. These activities are thriving in the region and growing fast with rapid changes. This has increased the volume of cargo and container handling at the network. With 131 cruise ship calls in summer 2019, the port network is now the third busiest port of call for cruise ships in Iceland. In summer 2018 the fourth largest cruise ship in the world, the MSC Meraviglia had three arrival calls to the Port of Isafjordur in the network.

The Port of Isafjordur is the biggest port and the hub but bustles with servicing cruise, fishing, and cargo/container vessels as well as recreational marine activities, such as whale watching, yachting, and sailboats. The port is located at the main axes of seaborne trade known as the coastal shipment around the country (cabotage) and it has a strategic location with short sailing time to the open sea. The three smaller ports (Sudureyri, Flateyri, Thingeyri) mainly render services to fishing boats and occasionally to smaller cruise ships, recreational boats, and cargo vessels.

The Isafjordur Port Authority has been contemplating to develop the ports network to meet today's and future demands. The port sectors are in the state of radical changes, and uncertainty is the biggest confronting challenge in port projects. This timely research project which is under auspices of the Municipality of Isafjordur (Ísafjarðarbær), is implementing "Flexible and Sustainable Port Planning" to the network to addresses these concerns.

Research Plan

Flexible and sustainable port planning has 6 work packages. This research project is aimed at implementing WPs 4, 5, and 6 of the plan for the Ports of Isafjordur Network. WPs 1, 2, and 3 of the plan have been completed in 2018-2020 as the doctoral project of the Principal Investigator (PI) of this research. Therefore, this research project constitutes three Work Packages (WP) along with Milestones (M) and Deliverables (D) as described below and shown in Figure 2.

The doctoral project was supported by:

1. A three-year research grant by the Municipality of Isafjordur, started in 2017,
2. A three-year research grant (scholarship) by the University of Iceland, started in 2018,
3. Four annual research grants by the Icelandic Road and Coastal Administration in 2018, 2019, 2020 and 2021.

WP1. Analyzing Port Stakeholder and Defining Success (accomplished in the doctoral project of the PI)

- Eskafi, M., Fazeli, R., Dastgheib, A., Taneja, P., Ulfarsson, G. F., Thorarinsdottir, R. I., and Stefansson, G. 2019. "Stakeholder Salience and Prioritization for Port Master Planning, a Case Study of the Multipurpose Port of Isafjordur in Iceland", *European Journal of Transport and Infrastructure Research*, 19 (3), pp. 214-260. https://doi.org/10.18757/ejtir.2019.19.3.4386

- Eskafi, M., Fazeli, R., Dastgheib, A., Taneja, P., Ulfarsson, G. F., Thorarinsdottir, R. I., and Stefansson, G. 2020. "A Value-Based Definition of Success in Adaptive Port Planning: A Case Study of the Port of Isafjordur in Iceland", *Maritime Economics and Logistics*, 22 (3), pp. 403-431. https://doi.org/10.1057/s41278-019-00134-6

WP2. Projecting Cargo Flow/Port Throughput (accomplished in the doctoral project of the PI)

- Eskafi, M., Kowsari, M., Dastgheib, A., Ulfarsson, G. F., Stefansson, G., Taneja, P., and Thorarinsdottir, R. I. 2021. "A Model for Port Throughput Forecast Using Bayesian Estimation", *Maritime Economics and Logistics*.

- Eskafi, M., Kowsari, M., Dastgheib, A., Ulfarsson, G. F., Taneja, P., and Thorarinsdottir, R. I. 2020. "Mutual Information Analysis of the Factors Influencing Port Throughput", *Maritime Business Review*. https://doi.org/10.1108/MABR-05-2020-0030

- Eskafi et al. Vessel Traffic Analysis and Forecast, (on going).

WP3. Dealing with Uncertainty (accomplished in the doctoral project of the PI)

- Eskafi, M., Dastgheib, A., Taneja, P., Ulfarsson, G. F., Stefansson, G., and Thorarinsdottir, R. I. 2021. "Framework for Dealing with Uncertainty in the Port Planning Process", *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 147 (3). https://doi.org/10.1061/(ASCE)WW.1943-5460.0000636

<u>The current proposal is for the following WPs.</u>

WP4. Evaluating the Port Plan (Will be carried out as the post-doctoral project of the PI)

Through the collection of existing views, this WP investigates criteria of flexibility and sustainability, their drivers, barriers, and enablers in different layers of a port. Each layer comprises physical, technical, operational, and institutional components. Flexible and sustainable criteria are incorporated into the predefined actions (actions have been developed in WP3).

Then, based on standard methods of evaluation, this WP develops an approach to evaluate costs and values of flexible actions (in the presence of uncertainty during a projected lifetime) while accounting for sustainability. The flexible and sustainable actions are evaluated not only in the port system but also by their interrelation with each other as increasing flexibility and sustainability in one action may reduce them in another action. The feasibility and viability of actions are analyzed whether they satisfy the technical/functional lifetime of the port.

As attitude to project appraisal is different among stakeholders (social, environmental, and economic values), costs and values of the actions are evaluated in a (mixed quantitative and qualitative) Multi-Criteria Analysis (MCA) approach. Thus, different direct and indirect merits of the plan are taken into account to ensure a balanced decision for improving the welfare of society, positive environmental impact, and guaranteeing the payback on investments. Flexibility and sustainability are made explicit as criteria in MCA. To account for uncertainty (e.g., future prices, future technology, and future conditions of the market), the cost and value of actions are adjusted over the projected lifetime of the plan.

This WP provides a comprehensive assessment of the costs and values of flexibility and sustainability in the port development project and supports decision making in the planning process. In this WP, a port network with flexible and sustainable layers is planned/designed. In this WP, M1 is to assess the costs and values of flexible and sustainable criteria in port planning. D1 is a report (ISI paper) based on M1. M2 is to present a flexible and sustainable port network plan/design. D2 is a report (ISI paper) based on M2.

WP5. Setting up a Monitoring System (Will be carried out as the post-doctoral project of the PI)

To monitor the performance of the plan and initiate timely action when assumptions (defined in WP3) start failing a monitoring system is set up. The monitoring system consists of signposts and triggers. Signposts specify the information that should be tracked to determine whether the plan is moving toward its success. A trigger is a timely and critical value of a signpost beyond which required actions (defined in WP6) should be implemented to ensure achieving success of the plan.

Port performance is an important factor in the productivity of ports. As improving the port performance increases the competitiveness of ports, and moves the plan toward its success, a port performance monitoring system is developed in this WP. Key Performance Indicators (KPIs) are specified as signposts in the monitoring system.

Monitoring of port performance requires complex analytical work as port performance is a function of different (dependent) variables (i.e., port throughput). These variables further depend (non-)linearly on multiple (independent) variables that reflect economic (i.e., GDP, population), societal (i.e., acceptance [e.g., of port extension with more port activities], patience [e.g., on congestion due to cruise passengers]) and environmental (i.e., climate change, pollutions) changes. Causal relations between variables are identified using qualitative and quantitative methods.

To monitor and forecast the port performance, an extensive Bayesian model of dependent and independent variables is developed. The model computes and analyzes uncertainty in real-world situations and accounts for epistemic uncertainty. The model calculates the probability of unknown parameters and updates known variables by conditional probability. The strength of the model lies in the fact that it allows any inference given the available information and it has adaptive learning capability to be updated over time based on new information. Therefore, it provides a continuous/real-time knowledge of (monitoring and forecasting) port performance. The model helps to understand the effect of independent variables in the forecast by outlining a network of causal relations while taking into account the sustainable criteria.

This WP provides an accurate system that can continuously monitor and forecast port performance aimed at maintaining the competitive edge of the port. The monitoring system further creates a database and network of information sharing between stakeholders. Thus, the system facilitates digitalization and automation which not only improves the efficiency of the ports but also safeguards their functionality in case of (IT, online) demand such as its necessity in the current COVID19 pandemic. In this WP, M3 is to develop a system to monitor and forecast port performance. D3 is a report (ISI paper) based on M3.

WP6. Developing Contingency Plan (Will be carried out as the post-doctoral project of the PI)

A contingency plan is a provision/alternative plan that safeguards the main plan. It protects the main plan against failing or departures from the pre-defined path towards its success, and handles unknown unknowns (opportunities and vulnerabilities), and black-swan events that manifest in the projected lifetime of the port. The contingency plans consist of timely and effective actions. These actions are applied if the signpost is triggered.

In the contingency plan, as long as the plan is moving toward its success, (defensive) actions are applied to preserve incoming benefits, or adjustments are made with necessary (capitalizing) actions to seize new opportunities and further improve the performance of the main plan. Furthermore, to meet challenges and handle vulnerabilities that appear in the projected lifetime, required (corrective) actions are developed. When the main plan loses its validity and is not moving toward its success anymore, essential (reassessment) actions initiated to reassess the (entire) plan and execute required changes.

This WP helps to avoid the creation of unprofitable capital-intensive investment at the beginning of the development plan, and the plan is only built based on new demand. In this WP, M4 is to develop contingency plan(s) to increase the robustness of the main plan. D4 is a report (ISI paper) based on M4.

Research Timetable

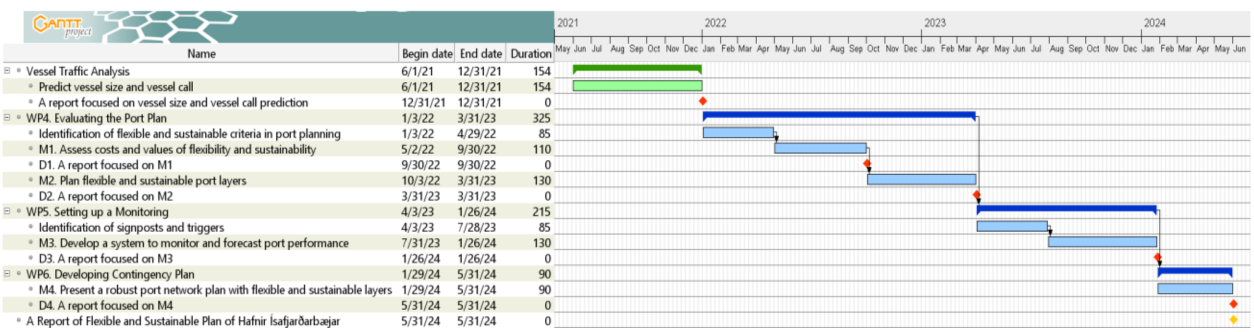

Figure 2. Research timetable; Work Packages (WP), Milestones (M), and Deliverables (D)

Management and Co-operation

The work will be carried out in cooperation with international scientific experts. The range of skills and expertise safeguards the successful completion of the project.

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Prof. Ragnheiður Inga Þórarinsdóttir (ragnheidur@lbhi.is)

Energy and Sustainability, Rector of the Agricultural University of Iceland, and Visiting Professor at the University of Iceland, Iceland.

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Port planning and Development, Senior Lecturer, Faculty of Civil Engineering and Geosciences, Delft University of Technology, The Netherlands.

Results, Benefits, and Prospective users of the project

Flexibility ensures operation and functionality of the port under changing requirements, accommodates diverse stakeholders' needs, and guarantees the payback on investments. It allows for future expansion, modification, and the synergy between related growing activities and benefits accrued to them. Hence, next generations can timely adapt and upgrade the port layers (infrastructure, operation, services) to satisfy their demands. This means the plan is not forced to be remade repeatedly on a costly ad-hoc basis. Flexibility further facilitates sustainability, as it obviates the need for environment damaging (e.g., land reclamation) or prolongs the useful lifetime of an infrastructure (improving lifecycle). Sustainability improves the societal integration of the port (following the European Commission definition and ISO 26000 on quality of life), in harmony with the surrounding natural environment.

As the **first such Flexible and Sustainable Port Planning in Iceland**, the main objectives of this research project are to:

1- provide a comprehensive report that details **Flexible and Sustainable Port Planning** in the Icelandic context and it will include developing a workable plan for the Ports of Isafjordur Network as a case. Therefore, the results of this research provide fundamental information to the Port Authority for informed decision making in (ongoing) planning, design, and the subsequent realization and exploitation phases of the Port of Isafjordur development.

2- deliver professional recommendations for technical and scientific communities to be more knowledgeable for flexible and sustainable planning of Icelandic ports;

3- increase awareness of stakeholders including decision makers and authorities about the importance of flexible and sustainable port planning and development;

4- develop strategic alliances and research clusters between (higher) education and research organizations, and the port community;

5- generate professional information (i.e., scientific publications, teaching, seminar, meeting, presentations at international conferences and news).

Furthermore:

1. This research is in line with the **ESPO** green guide for continuous improvement of port environmental performance, working with nature philosophy of **PIANC**, and PIANC guidelines on the planning of fishing ports, life cycle approach in port infrastructure, port master planning, and sustainable port.

2. This research supports the principal objective number 5 of climate change strategy by the Icelandic Ministry for the Environment and Natural Resources (**Umhverfis- og auðlindaráðuneytið**) "prepare for adaptation to climate change".

3. This research fulfills the Icelandic harbor Act, discussed by the Association of Icelandic Ports (**Hafnasamband Íslands)** in 2012, by providing information for the formulation of long-term policy in Icelandic ports development and involvement of port stakeholders to address their concerns and interests in the planning aimed at meeting their objectives in port developments.

4. This research is in line with the priorities of the Icelandic transport plan (2019-2023) published by the Ministry of Transport and Local Government (**Samgöngu- og Sveitarstjórnarráðherra**) including objective 4.1, sub-objective 3: to develop a policy for navigation and implementation and objective 4.2, sub-objective 1: to enhance monitoring that development and operations of roads and ports fulfill requirements, for instance, with respect to risk management.

5. This research supports The Icelandic Road and Coastal Administration (**Vegagerðin**) policy (2020-2025) for promoting sustainability of the Icelandic transportation system by presenting sustainable solutions in (port) development.

6. This research is in good agreement with the National Planning Agency (**Skipulagsstofnun**) Policy (2015-2026), to increase the competitiveness of the municipality (including the port) of the country, the quality of life, and the flexibility and resilience to social and environmental changes.

List of Publications

Peer-Reviewed Journal Publications

Eskafi, M., M. Kowsari, A. Dastgheib, G. F. Ulfarsson, G. Stefansson, P. Taneja, and R. I. Thorarinsdottir. 2021. “A Model for Port Throughput Forecasting Using Bayesian Estimation”, *Maritime Economics and Logistics*.
https://doi.org/10.1057/s41278-021-00190-x

Eskafi, M., M. Kowsari, A. Dastgheib, G. F. Ulfarsson, P. Taneja, and R. I. Thorarinsdottir. 2021. “Mutual Information Analysis of the Factors Influencing Port Throughput”, *Maritime Business Review*. https://doi.org/10.1108/MABR-05-2020-0030

Eskafi, M., A. Dastgheib, P. Taneja, G. F. Ulfarsson, G. Stefansson, and R. I. Thorarinsdottir. 2021. “Framework for Dealing with Uncertainty in the Port Planning Process”, *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 147 (3).
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Eskafi, M., R. Fazeli, A. Dastgheib, P. Taneja, G. F. Ulfarsson, R. I. Thorarinsdottir, and G. Stefansson. 2020. “A Value-Based Definition of Success in Adaptive Port Planning: A Case Study of the Port of Isafjordur in Iceland”, *Maritime Economics and Logistics*, 22 (3), pp. 403-431.
https://doi.org/10.1057/s41278-019-00134-6

Eskafi, M., R. Fazeli, A. Dastgheib, P. Taneja, G. F. Ulfarsson, R. I. Thorarinsdottir, and G. Stefansson. 2019. “Stakeholder Salience and Prioritization for Port Master Planning, a Case Study of the Multipurpose Port of Isafjordur in Iceland”, *European Journal of Transport and Infrastructure Research*, 19 (3), pp. 214-260.
https://doi.org/10.18757/ejtir.2019.19.3.4386

Peer-Reviewed Conference Publications

Eskafi, M., M. Kowsari, A. Dastgheib, and G. F. Ulfarsson. 2021. “Cargo Flow Analysis by Mutual Information Analysis; a Case Study of the Multipurpose Port of Isafjordur in Iceland”, *World of Shipping Portugal, An International Research Conference on Maritime Affairs*, Carcavelos, Portugal, 11 p.

Eskafi, M., M. Kowsari, A. Dastgheib, and G. F. Ulfarsson. 2020. “Forecasting Container Throughput Using a Bayesian Model”, *PIANC Asia Pacific Conference*, Fremantle, Australia, p. 41-42.

Eskafi, M., A. Dastgheib, P. Taneja, G. F. Ulfarsson, and G. Stefansson. 2020. “Flexibility in Port Logistics by Adaptive Port Planning, a Case Study of the Ports of Isafjordur Network in Iceland”, *The Nordic Logistics Research Network Conference*, Reykjavik, Iceland, 15 p.

Conference Presentations and Posters

Eskafi, M., A. Dastgheib, and G. F. Ulfarsson. 2021. “Developing Port Flexibility for Adaptation of a Cruise Port in Iceland in the Post-COVID-19 Era”, *Green Port, Cruise and Congress*, Piraeus, Greece, October 20-22.

Eskafi, M., A. Dastgheib, P. Taneja, R. I. Thorarinsdottir, and G. F. Ulfarsson. 2021. “Port Transformations by Adaptive Planning, an Icelandic Case of the Ports of Isafjordur Network”, *EcoCity World Summit*, Rotterdam, The Netherlands, September 27-28.

Eskafi, M., M. Kowsari, A. Dastgheib, and G. F. Ulfarsson. 2021. “Cargo Flow Analysis by Mutual Information Analysis; a Case Study of the Multipurpose Port of Isafjordur in Iceland”, *World of Shipping Portugal, An International Research Conference on Maritime Affairs*, Carcavelos, Portugal, January 28-29.

Eskafi, M., M. Kowsari, A. Dastgheib, and G. F. Ulfarsson. 2020. “Forecasting Container Throughput Using a Bayesian Model”, *PIANC Asia Pacific Conference*, Fremantle, Australia, December 1-3.

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Eskafi, M., R. Fazeli, A. Dastgheib, P. Taneja, and G. F. Ulfarsson. 2019. “Community Stakeholder Salience for Adaptive Port Planning in Remote Coastal Areas, A Case Study of the Multipurpose Port of Isafjordur in Iceland”, *Institution of Civil Engineers Conference of Coastal Management*, La Rochelle, France, September 24-26.

Eskafi, M., A. Dastgheib, P. Taneja, G. F. Ulfarsson, G. Stefansson, and R. I. Thorarinsdottir. 2018. “Flexible and Adaptive Port Planning, a Case Study of the Multipurpose Port of Isafjordur in Iceland”, *Icelandic Road and Coastal Administration Conference*, Reykjavik, Iceland, November 2.

Eskafi, M., R. Fazeli, A. Dastgheib, P. Taneja, and G. F. Ulfarsson. 2018. “Stakeholder’s Value Identification for Adaptive Port Planning, Case Study of the Port of Isafjordur in Iceland”, *CoastGIS Conference*, Isafjordur, Iceland, September 27-29.

Seminar Presentations

Eskafi, M. 2019. “Flexible and Adaptive Port Planning”, Seminar Series, Faculty of Civil and Environmental Engineering, University of Iceland, Reykjavik, Iceland, February 7.

Eskafi, M. 2021, “Dealing with Epistemic Uncertainty in Port Throughput Forecast”, Seminar Series, Faculty of Civil and Environmental Engineering, University of Iceland, Reykjavik, Iceland, February 17.

Media Coverage

Eskafi, M. 2020. “A Flexible and Sustainable Port Network by Adaptive Port Planning”, NORDIC Road and Transport Research (news web), November 25. https://nordicroads.com/

Eskafi, M. 2020. “Meeting on the Future of the Ports of Isafjordur Network in Iceland”, (in Icelandic: Fundur um Framtíð Ísafjarðarhafnar), Baejarins Besta (news web), Iceland, May 20. http://www.bb.is/

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Eskafi, M. 2018. “Development of the Ports of Isafjordur Network in Iceland”, (in Icelandic: Bætir innviði Ísafjarðarhafnar), Tímarit Háskóla Íslands-Háskólafréttir (University of Iceland Magazine), Iceland, March 2018. https://www.hi.is/

Workshop

Eskafi, M. 2020. “Workshop on Planning of the Ports of Isafjordur Network in Iceland”, (in Icelandic: Vinnufundur vegna skipulags hafnarsvæða), Isafjordur, Iceland, May 19.