Project information

Keywords
shipping, Arctic, drivers, forecasts, statistical analysis
Project title
Shipping in the Arctic – Drivers and forecasts.
Year
2016
Project leader
Eirik Mikkelsen, Norut
Geographical localization of the research project in decimal degrees (max 5 per project, ex. 70,662°N and 23,707°E)
All of the Arctic sea areas are relevant
Participants

Norwegian Coastal Administration (NCA): Øyvind Rinaldo, Claus Kamstrup, Alexander Frostis;

Norut: Eirik Mikkelsen, Anne Katrine Normann, Sindre Myhr; Øystein Myrland;

Capia: Stian Berger, Marius Runningen Larsson

Fridtjof Nansen Institute (FNI): Arild Moe;

Akvaplan-Niva (APN): Rune Rautio.

Flagship
Arctic Ocean
Funding Source

Fram Arctic Ocean

Summary of Results

This is progress report as of 15 November 2016. Project is not finished yet.

The Main and part objectives and goals of the project are stated below. They correspond to the tasks to be performed in the project. Status for each task is given. There have been meetings for all project participants (11/3, 4/4, 6/6, 31/8, 21/9, 21/10, 1/11), and several other smaller meetings.

Main objective: Improve knowledge and tools to make prognoses for ship traffic in the Arctic, particular traffic of relevance for Norway.

Part objective 1. Identify and analyse stakeholders relevant for the project.

Stakeholders have been identified through document and web searches, as well as through brainstorming in the project group and from stakeholders interviewed. The aim is to map and interview stakeholders about their possible interest in and need for better data and prognoses on Arctic shipping, as well as the availability of relevant information and data for shipping drivers. A number of stakeholders have been interviewed and contacted. In general, the interest and need for prognoses on Arctic shipping seems somewhat limited.

Part objective 2. Identify the most import traffic and ship types to improve prognoses for the Arctic for (for Norwegian interests), and select some prioritised for analysis in 2016.

Based on input from stakeholders, document studies and the knowledge and needs of the project members (including the Norwegian Coastal Administration), we have decided to concentrate on oil-related shipping, LNG, dry bulk/minerals and cruise/tourism. The timehorizon is crucial for which of these to focus on and for which drivers to include. For LNG in particular, but also petroleum, the traffic in the shorter term (2-5 or even 10 years) is to a large degree set unless very dramatic changes will occur. Other types of traffic that we also have discussed are transits (regular container traffic, but also more ad-hoc) and fisheries. For our consideration of which traffic types to prioritise the following factors have been emphasised: total volume of traffic, particular risks related to environment or safety, if new knowledge about the traffic and its outlook is likely to affect choices and actions for Norwegian actors (like new or changed needs

for monitoring, for preparedness, for other types of management, for infrastructure, or for industry actors).

Part objective 3. Establish time series of likely highly relevant drivers for Arctic shipping, suitable for joint analysis with AIS traffic data from the Norwegian Coastal Administration (and all planned to be included in the NCA's data warehouse).

The work with the NCA's data warehouse have been advancing during 2016, but in August it became clear that the NCA data warehouse would not be operational to the extent that it will be of use for our project in 2016. We have all the time had a "plan B" of using Capia's data infrastructure for collecting and handling data on both traffic and drivers. This infrastructure has been developed further as part of the project, preparing datasets for analysis and making modules in R (a statistical software-suite) to handle data and analysis as well as enabling communication with external users.

Part objective 4 and 5 have to a large degree been worked towards in an integrated fashion:

Part objective 4. Try to identify significant drivers for the selected types of Arctic ship traffic.

Part objective 5. Investigate methods for forecasting prioritised Arctic ship traffic segments.

A number of datasets on drivers have been collected. We have performed some simple linear regression analyses of some traffic types (ship types and –sizes for specific areas or passing lines I that we have actual traffic data on from Havbase (http://havbase.no/havbase_arktis)), and knowledge and data on drivers. Drivers include macroeconomic conditions (world market prices and exchange rates, aggregated demand data for sectors). We have analysed tourism traffic (passenger ships' sailed distance in the Barents Sea) with data on tourism demand and also on exchange rates (EUR-NOK and Euro-NOK), and find some covariation. We have also considered oil service ship traffic in the Barents Sea and its covariate with oil-price.

For the forecasts we have performed univariate analyses (considering only the patterns of variation in the traffic data themselves; seasonality and trend) and partly regression analyses studying the impact of drivers, and the ability to build shorter time-horizon prognoses from this. Results on tourism traffic ("passenger vessels") and offshore supply traffic ("other offshore ships") indicate that there is some ability to statistically forecast for the shorter term. The assessment is done by reserving the newest period of sailing data (a "test set") for testing the forecasts. For the tourism traffic the short term forecasts can be improved by including the EUR-NOK exchange rate as predictor, but the improvement varies with ship sizes. For the offshore supply traffic the short term forecast is much improved by including the oil price. Testing with machine learning methods we find that the forecasts can still be improved.

Part objective 6. Perform forecasts for selected Arctic ship traffic.

Only preliminary tested based on pure traffic data, as described above.
For the last weeks of the project we search for prognoses for drivers which then also can be used to make prognoses for the ship-traffic.

Part objective 7. Have good project management, good cooperation and communication with relevant stakeholders, and disseminate results to stakeholders and the wider public.
Project management is through meetings (physical/skype) and email and telephone contact. There has been contact with a number of stakeholders, but mainly for information gathering and less for dissemination or information from the project. More dissemination will take place as results become available.

Master and PhD-students involved in the project

Not as part of the project itself, but one of the participants from Norut is a PhD-student on another topic.

For the Management

Too early to conclude. Some promising results for short term forecasts of some traffic types, but needs more work.

Published Results/Planned Publications

Not yet published. Plan to make one scientific publication. We have produced some internal research notes

Communicated Results

Too early

Interdisciplinary Cooperation

The project is a collaboration between economists, statisticians, political scientists, engineers/ICT personnel, and persons with business or public management background and experience. This is tailored to meet the needs of the project.

Budget in accordance to results

Yes

Could results from the project be subject for any commercial utilization

No

Conclusions

No conclusions yet.