



SUSTAINABILITY TRANSITION

THE PROMISE OF DIGITALIZATION

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Since enabling technologies such as sensors, communication, data storage, advanced modelling and simulation have become cheaper and more reliable, digitalization has become a buzzword in shipping. The new information and communication technologies (ICT) are expected to make shipping 'safer, smarter, greener' and altogether more sustainable. The substantial environmental footprint of shipping operations has been arguably difficult to address due to the industry's transboundary nature, in particular due to the existence of a so-called regulatory gap and weak compliance with existing regulation. What are the opportunities – and the limitations – of a sustainability transition in the shipping industry enabled by the new ICT?

REGULATING SUSTAINABILITY IN SHIPPING

Since the 1960s, a complex architecture of international, regional and national agreements have been implemented in order to protect oceans (and the species

inhabiting them) worldwide. Such efforts have recently been bolstered by private regulation. Public governance has been traditionally exercised through mandatory command-and-control instruments such as laws and regulations, yet more recently, market-based instruments that seek to incentivize certain behaviour, as well as soft instruments that provide information and guidance, took off. In addition, an array of codes of conduct, private certification schemes and corporate social responsibility initiatives have further contributed to protect global oceans, coastal communities, and seafarers from the negative effects that can stem from seagoing vessel operations.

Though this variety of rules creates a comprehensive framework for sustainable shipping, their implementation at the level of an individual vessel vary significantly. One of the major challenges to sustainability governance in shipping is a lack of enforcement capacity within the states and among the transnational

actors to effectively monitor transboundary shipping. Until recently, managing many aspects of sustainable shipping has been largely dependent on self-regulation and voluntary compliance.

THE PROMISE OF DIGITALIZATION

Digitalization has the potential to radically transform the shipping industry and make it more sustainable by contributing to improved safety, environmental and commercial performance. Shipping is a latecomer to the digital world, but for a good reason: connectivity at sea has been limited until very recently. With improving satellite data transmission and rapidly decreasing costs of sensors, the door is opening for a maritime Internet of Things (IoT). What we have observed so far is just the tip of the iceberg – in the next decade, new ICT will be deployed and change the way shipping operates.

'Big data' is a key term to describe the ongoing changes. Currently, usual practice is a noon report sent by a captain for inspections

Area	What will change
Operations efficiency	Supply chains will be organized more efficiently, incl. fleet utilization, asset integrity management, full capacity. Maintain or reduce the present freight cost levels.
Maritime safety	Navigation tools, remote and eventually autonomous operations. Reduce fatality rates by 90% below present levels.
Energy efficiency	Optimized routing, trim, fuel consumption, emission management. Reduce fleet CO2 emissions 60% below present levels.
Monitoring and control	More transparency, possibility to collect and share information beyond noon report, opportunity for maritime authorities to monitor compliance 24/7, e-port compliance and e-customs.

Table 1. Digitalization in shipping: “The Sustainability Revolution”

and port checks, but in the future there will be a possibility to aggregate enormous amounts of data and build intelligence on top of it. Table 1 provides an overview of the digitalization promises in shipping. The benefits of ships becoming data-smart are not only in new business opportunities in transport and logistics, but also in addressing ship performance, safety, and energy efficiency. Intelligence built on top of big data collected by sensors installed on ships opens up new possibilities for environmental monitoring. This new information paradigm could also ensure transparency, enable public scrutiny and make shipping more environment-friendly. Proactive policy intervention is thus required to ensure access to data for all relevant stakeholders. Among other things, digitalization will enable a number of new measures to improve energy efficiency and thereby help in decarbonizing the global shipping industry. Sustainability transition in shipping is increasingly coupled to digitalization and advances in big data methodologies.

KNOWLEDGE INEQUALITIES

While it seems like there are big changes ahead for the maritime industry, not all the actors in the sector are within ‘innovative niches’, ready to adapt to the newest technologies. Unequal knowledge about new technologies, their potential and their disruptive effects, as well as the state-of-the-art in research and innovation, leads to the fact that many actors continue ‘business as usual’ not because of a so-called technological ‘lock-in’ or proactive resistance, but rather due to negligence.

Big data analytics is a case in point. At the stage of digitalization, shipping and logistics companies acquire sensors to equip their assets, as well as connect with technology companies who provide data transmission and storage. In order to benefit from the resulting tremendous data stream, there is a need to develop applications that can make sense of all the incoming data and provide meaningful information. This brings new players into the picture, those advancing the use of data to simulate, model, predict, and, eventually, automate

ship operations and navigation.

At the moment we still do not know whether there will be an ultimate technology and/or an ultimate provider for shipping intelligence, or a universal platform (or multiple) for shipping data, but we observe many new stakeholders entering the shipping business. For example, engine manufacturers want to have control over the data generated by ship engines, but also classification societies, underwriters and innovative growth companies want access to data that will allow them to realize new business models, while authorities are interested in the same data for compliance monitoring.

While we do not know how the issues around data control, ownership and usage will be organized in a few years from now, it is sensible to suggest that the actors who do not enter these conversations today are lacking the knowledge with regard to their importance. Digitalization is not the only game in town and many ship-owners and operators, especially small and medium-sized, are concerned with the pressures of today. Extremely low freight rates and the need to operate on very thin margins under increasingly stringent environmental regulation continue to trouble owners

and operators. Many stakeholders do not yet realize the scale of the increasing ‘datafication’, and remain on the fringes of the digital transformation. As a result, knowledge inequalities create a situation in which many incumbent actors are outside of the relevant discussions and thereby contribute to the technological lock-in. Overall, this means many are unenlightened with regard to the ongoing information evolution. In this state, the power slips from their hands, as important decisions regarding big data are being made within a relatively narrow group of actors.

CHALLENGES FOR POLICY-MAKING

This situation has consequences for policy-making, as it requires a new regulatory design that can stimulate shipping sustainability transition. Big data is just one example of how innovative technology is being negotiated between innovative newcomers and large incumbent actors, while other smaller actors are left out of the process. Policy support would need to find ways to target the actors who actually have power to propel change – but as power shifts with widening knowledge inequalities, it will be increasingly difficult to devise policy instruments that matter.

ABOUT THE AUTHOR

Dr Daria Gritsenko studied in St. Petersburg, Hamburg, Turku and Helsinki and currently works as an assistant professor at the Aleksanteri Institute (University of Helsinki). During eight years of scholarly work on maritime transportation and energy, she focused her research on policymaking activities of private actors, environmental sustainability and large infrastructure governance, resulting in 20+ articles in international peer-reviewed journals and professional magazines. Her most recent project investigates the increasingly significant impact of digitalization, ‘datafication’, and algorithms on state, business and society in Russia and beyond.

ABOUT THE ORGANIZATION

The Aleksanteri Institute at the University of Helsinki (Finland) functions as a national centre of research, study and expertise pertaining to Russia and Eastern Europe, particularly in the social sciences and humanities. The institute promotes cooperation and interaction between the academic world, public administration, business life and civil society, both in Finland and abroad.

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