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# POLICY BRIEF

## Key points

- There is a need for policy design at the national and international levels to ensure that developing countries can benefit from the digitalization of maritime transport.
- It is important to provide support for innovation at home, as policies that facilitate access to cutting-edge technologies can affect the trade competitiveness of importers and exporters.
- Developing countries need to build institutional capacity in competition and data protection.
- Policymakers can facilitate cooperation by promoting national collaborative platforms.



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## DIGITALIZATION IN MARITIME TRANSPORT: ENSURING OPPORTUNITIES FOR DEVELOPMENT

Digitalization and new developments in artificial intelligence, blockchain, the Internet of things and automation, are of increasing relevance to maritime transport. They help optimize existing processes, create new business opportunities and transform supply

chains and the geography of trade. Notwithstanding the potential opportunities and benefits offered by these technologies, they also entail risks and potential costs to maritime actors in developing countries. It is thus necessary to establish a level playing field.

This policy brief discusses the role of interoperability and global standards, the importance of promoting technological innovation, while avoiding monopolistic outcomes, and the need to ensure that digitalization works towards the achievement of the Sustainable Development Goals.

Port and shipping services can significantly benefit from digitalization. UNCTAD research indicates that maritime transport, with a fleet of 95,402 ships, carries about 80 per cent of global trade volumes.<sup>1</sup> Practically all the data behind any maritime trade transaction and transport operation are being digitized. The Internet of things, coupled with an increasing availability of data, will allow for an exponential growth of automated processes. The combination of enhanced digital and physical connectivity will help carriers, seaports and intermodal transport providers integrate their processes with the shippers' own globalized supply chains,



providing a better visibility of shipments at any given time. This is facilitated by artificial intelligence, which can help analyse the growing volume of data from automatic identification systems; global positioning systems; and tracking devices for cargo and containers. These data can be reported and securely stored on the blockchain, making them tamper-proof and trackable. To benefit from these trends, developing countries need to ensure not only access to these services, but also participation in the business as service providers, while ensuring a positive net impact on employment.

<sup>1</sup> UNCTAD, forthcoming, *Review of Maritime Transport 2019*.

## Stages of digitalization in maritime transport

The effects of digitalization on maritime transport can be divided into the following three stages:

1. Optimization – maximizing efficiency and reliability in existing processes to reduce the costs of trading.
2. Extension – moving beyond efficiency to produce opportunities for new services and businesses.
3. Transformation – reinventing logistics, trade and business models, based on data-driven revenue streams and shifts in trade flows.

### Stage 1: Optimization

Smart logistics operations have already led to a significant reduction in expenditures on inventory holdings, while more money is spent on fast, reliable and – where possible – just-in-time deliveries.<sup>2</sup> More and more ship navigation and port terminal processes are becoming automated. Several recent initiatives are assessing the optimization opportunities that come with these new technologies. Port-call optimization, for example, optimizing vessel speeds and routes, can reduce carbon-dioxide emissions and waiting times in ports.<sup>3</sup>

Port authorities and terminal operators have joined forces to optimize port and intermodal connections.<sup>4</sup> In addition, shippers and other stakeholders have been supporting a maritime logistics dialogue to encourage the exchange of data and collaboration along global supply chains.<sup>5</sup>

### Stage 2: Extension

New businesses become possible through digitalization. In maritime transport, for

example, new business opportunities include the use of blockchain technology for bunkering, cargo tracking, smart capacity-management platforms, circular ship recycling and waste management, crew recruitment and market allocation. Achieving optimization, for example, that of port calls, mentioned above, also provides new business opportunities for companies that provide the services to optimize vessel speeds and routes.

### Stage 3: Transformation

As a result of optimization and technology-driven efficiencies, supply chains become more effective, and transportation costs drop. This, in turn, can be expected to drive further economic growth, and geographical distance may become less relevant as a determinant for the geography of trade. Digitalization will transform not only the port and shipping business, but it will likely change the global geography of trade, as comparative advantages of nations will shift. Labour costs, too, will become less relevant, while innovation and trade efficiency will become more important.<sup>6</sup> This will also have a bearing on the demand for port and shipping services.

## Key considerations for development

Developing countries need to ensure that they will remain competitive and that their seaborne trade will benefit from improvements that can be achieved by digitalization. They will also need to invest in human, institutional and technological capacities so that their traders and service providers can seize new business opportunities. It will be important to ensure a level playing field for traders and service providers from developing countries.



2 For a detailed discussion of determinants of transport and trade costs, see UNCTAD, 2015, *Review of Maritime Transport 2015*, chapter 3 (United Nations publication, Sales No. E.15.II.D.6, New York and Geneva). Examples of how blockchain and the Internet of things can help cut supply chain costs can be found in Boston Consulting Group, 2018, *Pairing blockchain with IOT [Internet of things] to cut supply chain costs*, 18 December.

3 Port of Rotterdam, 2018, "Just-in-time" sailing saves hundreds of thousands of tonnes of CO2 [carbon dioxide], 18 October.

4 Global Institute of Logistics, 2017, *Port Benchmarking Group*, available at [www.globeinst.org/chainport/](http://www.globeinst.org/chainport/) (accessed 4 June 2019).

5 International Transport Forum, 2018, *Global maritime logistics dialogue: Towards holistic governance of the maritime logistics chain*.

6 For further discussion, see UNCTAD, 2018a, *Review of Maritime Transport 2018* (United Nations publication, Sales No. E.18.II.D.5, New York and Geneva), p. 15. With regard to the impact of digitalization on employment in the transport sector, see World Maritime University, 2019, *Transport 2040: Automation, Technology, Employment – The Future of Work* (International Transport Workers' Federation, London).



This will require careful consideration of the role of interoperability and global standards; the need to promote technological innovation while avoiding monopolistic outcomes; and sustainable development, especially with regard to the 2030 Agenda for Sustainable Development.

### *Interoperability and global standards*

Policymakers and international organizations need to promote the interoperability of data-driven processes in international shipping and trade, including through international standards.

One of the most successful standards for international trade has been the container. Initially, different companies were using different dimensions, and boxes could not be used on all routes or modes of transport. Later, first at the national level in the United States of America, and then at the international level through the International Organization for Standardization, the public sector agreed on the Organization's standards for the intermodal container as it is known today.

As port and shipping services are being digitalized, standards for data will be just as important. A case in point are blockchain applications, where several shipping lines have recently started to develop technological solutions in cooperation with leading information technology companies.<sup>7</sup> The challenge is to encourage the development and use of the necessary standards, including by the industry itself, while making sure that these do not become closed standards that could exclude some players – especially smaller companies from developing countries.

The development of laws, regulations and international instruments is a lengthy, time-consuming process, while technology continues to accelerate at an exponential pace. To avoid a regulation gap, it will be important for today's policymakers and regulators to keep in mind that they need to be fit for the technologies of tomorrow. The process of developing technological standards could be led or coordinated by international entities, such as the United Nations Centre for Trade Facilitation and Electronic Business or the International Organization for Standardization, which



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would ensure collaboration among all groups of stakeholders. This would safeguard against the domination by one company or interest group developing the standards. The standards should be independent of digital platforms to allow for the adoption of future technologies. It is essential to enable developing country Governments to participate in the establishment of relevant global standards, for example through capacity-building and active participation in these international forums.<sup>8</sup>

### *Competition and data protection*

Container transport providers, shippers and intermediaries all compete for a greater stake and influence in supply chains. To benefit from the opportunities offered by digitalization, companies along the supply chain need to find ways to comfortably engage in more collaboration – within applicable laws that govern data ownership, protection and competition.

Governments and competition authorities should ensure that service providers make the best use of digitalization and that these benefits are passed on to clients. Sharing data to improve operations is one thing; using this same data to create artificial capacity constraints or engage in price setting to stifle competition is another. In view of the ongoing consolidation in container shipping, this challenge is becoming more pertinent. The least developed countries in particular often lack the institutional capacity of strong competition authorities to monitor and possibly intervene in the case of monopolistic markets.

7 Digital Container Shipping Association, [www.dcsa.org/](http://www.dcsa.org/) (accessed 4 June 2019).

8 For further discussion on this topic, see UNCTAD, 2018b, Why semantics standards matter for electronic data exchanges and for trade facilitation, Transport and Trade Facilitation Newsletter No. 79, 1 October; UNCTAD, 2019, How using global data exchange standards can contribute to innovation, Transport and Trade Facilitation Newsletter No. 81, 13 March.

## Ensuring the promotion of sustainable development through digitalization

The optimization of transport operations has been shown to lead to a decline in accidents at ports and at sea, reduce pollution and emissions and generally help minimize negative externalities and streamline the transport of international trade.<sup>9</sup> Therefore, digitalization in shipping can contribute to achieving the Sustainable Development Goals, including Goal 13 on climate action and Goal 14 on life below water. Many efficiency improvements will also cut costs and time for traders; improve transparency; and facilitate the participation of micro, small and medium-sized enterprises, which are often run by women. This can contribute to gender equality (Goal 5) and improved transparency and good governance (Goal 16).<sup>10</sup>

Optimization and automation can also result in a reduction in traditional employment, both manual labour (for example, port work), as well as office work (for example, tasks that are being automated). This may have a negative bearing on the job market (Goal 8), and if developing countries are not successful in participating in the new business opportunities, this could have an adverse impact on innovation and infrastructure development (Goal 9).

The overall impact of digitalization in maritime transport on the achievement of the Sustainable Development Goals will depend on the international framework and national policies affecting transport, employment, the environment, innovation and competition.

### Policy recommendations

There is a need for policy design – at the national and international levels – targeted at ensuring that developing countries, particularly the least developed countries, are not left behind and can benefit from the digitalization of international maritime transport, both as traders and as port and shipping service providers.

Technological capacity: A policy that facilitates access to the latest and best technologies – which may come from abroad – can be positive for the trade competitiveness of importers and exporters. At the same time, it

can have a negative side effect – discouraging innovation and investment in new digital port and shipping solutions at home. Support at home for innovation needs to mitigate this risk. For some digital innovations in shipping, developing countries may be at a disadvantage, owing to a lack of financial resources and of human, institutional and technological capacities. For others, they may leapfrog, as they are not hindered by existing systems.

Institutional capacity: With regard to new business opportunities in shipping generated by digitalization, it will be essential to ensure a level playing field for transport operators and other service providers from developing countries and the least developed countries. Ensuring competition and data protection is particularly important to protect smaller players in the shipping business. Developing countries need to build institutional capacity in the areas of competition and data protection.

Human capacity: Digitalization and new business opportunities in shipping will bring an increase in demand for qualified professionals, particularly in logistics, information technology and related areas. To fully benefit from new business opportunities in the digital economy, the corresponding human, institutional and technological capacities of developing countries should be enhanced at the same rate as technological progress in the industry.

Cooperation: Often, technologies are not the main obstacle to achieving collaboration and optimization along the maritime supply chain. The challenge is rather to make different stakeholders cooperate and trust each other. Although the technologies for data sharing exist, many stakeholders consider they are not yet prepared to embrace them – and therein lies a key challenge that the maritime transport industry faces as it looks to benefit from digitalization. Policymakers can facilitate cooperation by promoting national collaborative platforms such as the single window, port community systems or national trade facilitation committees.

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9 M Fruth and F Teuteberg, 2017, Digitization in maritime logistics: What is there and what is missing? Cogent Business and Management, 4(1); UNCTAD, 2018c, Digital data sharing: The ignored opportunity for making global maritime transport chains more efficient, Transport and Trade Facilitation Newsletter No. 79, 19 September.

10 UNCTAD, 2016, *Trade Facilitation and Development: Driving Trade Competitiveness, Border Agency Effectiveness and Strengthened Governance* (United Nations publication, Geneva).