



# THE DIGITALIZATION OF TRADE AND LOGISTICS



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The growing preponderance of information technologies in maritime shipping has led to an array of buzz words that tend to be rather meaningless without a proper context. One of the most abused terms is 'smart' as applied to logistics, such as 'smart supply chains' or 'smart port'. This gives an unproved judgment of value to technology (sentience?). Conversely, the term digitalization, which is more appropriate, relates to the integration of information technologies to the processes of transport management and operations. It concerns the bundling of transportation services to users through an information technology platform. Digitalization is a neutral term since it does not imply any specific value; there is no need to be smart.

## UNINTENDED OUTCOME

While many aspects in the introduction of information technologies focused on issues such as vehicle performance and navigation, the transactional aspects remained mired in complex procedures, particularly when international trade is concerned. Digitalization is process that has no particularly clear outcome since it

concerns several aspects of transportation, supply chains and trade facilitation. Although it can be perceived as a recent trend, digitalization has been ongoing for at least two decades as shippers, carriers, ports and logistics service providers developed their management platforms and data exchange protocols. A core goal was to become 'paperless', which provides substantial benefits since supply chains are process and information intensive. As each corporation pursued its digitalization, an outcome was a large number of platforms and the related fragmentation of the information.

Still, the trend is towards consolidation and the setting of standards which favored digital internationalization; the setting of information structures and protocols across organizations and jurisdictions. Digitalization can be driven by expansion, integration and consolidation in the maritime shipping industry, implying that a corporation has a wider and more complex portfolio of assets to manage. Terminal operators are a salient example of having expanding portfolios where each terminal is a complex information management unit. Consolidation within shipping lines

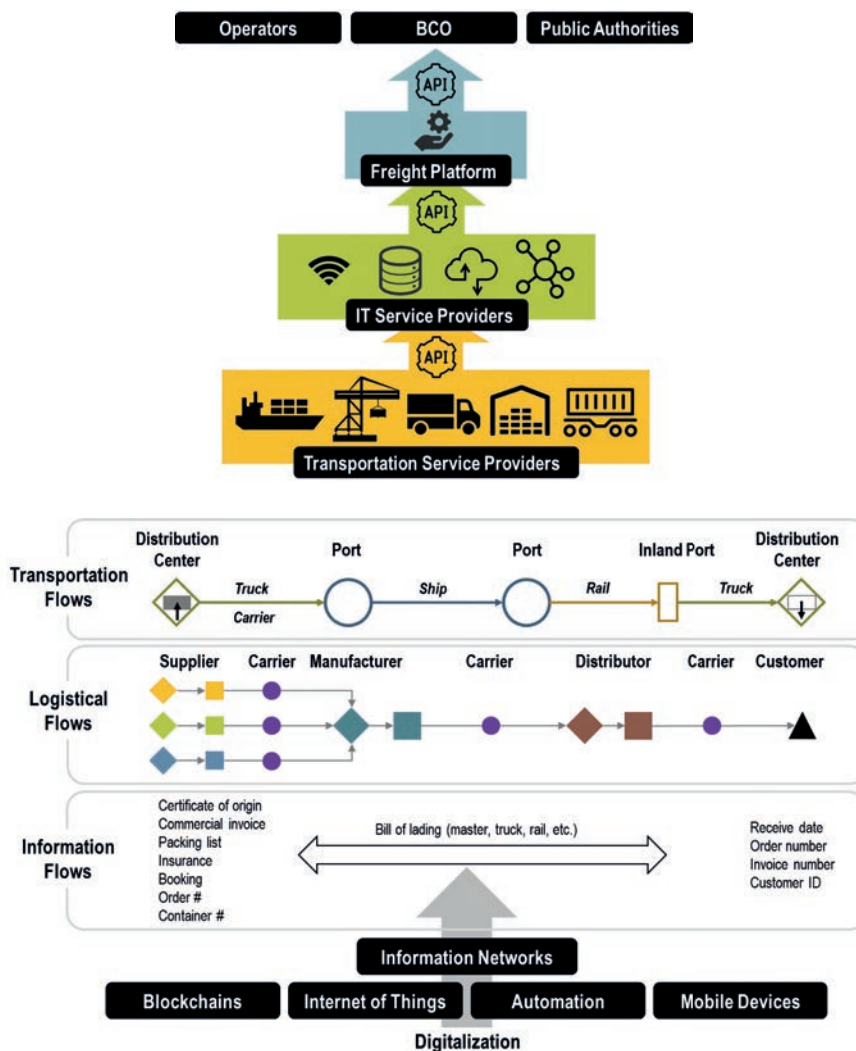
further underlines the need for information technologies to maximize asset utilization through the setting of shipping networks and the connectivity. Further, coordination between shipping lines, terminals and hinterland transportation also requires massive information exchange.

## VERTICAL DIGITALIZATION

Digitalization is now taking a new form with the expectation that information technologies will help improve the connectivity between modes but also between processes related to their management. From a vertical integration standpoint, it incites the development of new platforms where actors can interact in the provision, use and exchange of transportation services. A port community system is such a platform focusing on the connectivity of a node.

There are several layers involved in vertical digitalization with at the base transportation service providers willing to provide services on a market (a freight platform) and the strategic information that can be used by IT service providers. To do so, application programming interfaces (API) are defined

Figure 1: Vertical Digitalization: Digital Freight Platform



(ship load factor, inventory turnover, yard management, etc.). Since many segments of the shipping industry have tight margins, it comes as no surprise that digitalization is actively pursued as a competitive and cost saving tool. Still, the latter can be paradoxical since digitalization leans on information exchange and that transport service providers can be reluctant to share this information due to competitive pressures. There is thus an issue of trust for the actors involved in digitalization, which Blockchain technologies are trying to address.

Further, the additional value that can be derived for the users of digital platforms remains unclear. What will be the multiplier effects of digitalization on trade? If trade becomes less transaction intensive, does this necessarily mean that there will be more trade? UNCTAD recently underlined that the managerial friction for shipping is similar to customs duties and delays, implying a clear potential for improvements. IBM and Maersk recently claimed that the application of Blockchain technology can reduce transit times by a factor of 40% for an international trade segment. While the digitalization of logistics and trade remains unavoidable, its full impacts, including its unintended consequences, remain unclear. There may even be a tendency to exaggerate the benefits of digitalization and undermine the costs, complexity and risks of its implementation across transport and supply chains.

**ABOUT THE AUTHOR**

Dr Jean-Paul Rodrigue is a Professor at Hofstra University, New York. His research interests mainly cover the fields of transportation and economics as they relate to logistics and global freight distribution. Specific topics over which he has published extensively cover maritime transport systems and logistics, global supply chains, gateways and transport corridors.

**ABOUT THE ORGANIZATION**

PortEconomics is a web-based initiative aiming at generating and disseminating knowledge about seaports. It is developed and empowered by the members of the PortEconomics group, who are actively involved in academic and contract research in port economics, management, and policy. Since October 2012, Port Technology International and PortEconomics have been engaged in a partnership.

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Figure 2: Horizontal Digitalization

methods of communication that enables to retrieve public or permissioned information in real time according to pre-defined standards on the freight platform.

**HORIZONTAL DIGITALIZATION**

A more complex form of digitalization concerns a horizontal process across supply and transport chains. This approach raised a lot of attention in recent years because of the physical and process connectivity it confers. Digitalization is now increasingly seen as a tool to improve the connectivity of logistics and intermodal chain.

The main elements of the digitalization of transport and supply chains, including their related information flows, involve:

- Blockchains: Digital ledger systems that provided a new impetus to address the growing transactional complexity of transportation, particularly as it concerns logistics. Maritime shipping companies such as Maersk have been developing blockchain applications to make bill of lading, customs and letter of credit information easier to manage.
- Internet of Things: Connected vehicles and

equipment that are able to dynamically communicate attributes related to their operation (identification, location, temperature, etc.) to sensors. Containers, particularly refrigerated containers, are being connected to sensors to provide real time information about their location and integrity attributes.

- Automation: Vehicles and equipment able to operate autonomously and with limited supervision. Port terminal equipment such as gates and cranes are being automated while automated vehicles such as trucks are close to become operational.
- Mobile devices: Personal computing devices able to run applications and communicate with information networks.

**EXPECTED IMPACTS**

Several aspects of digitalization remain unproven, but the most common expectations relate to improvements in the efficiency of logistics and transportation. As such, both the demand for transportation and freight and its supply are better synchronized resulting better asset utilization