

Global Container Shipping Market Development and Its Impact on Mega Logistics System

A.S. Grzelakowski

Gdynia Maritime University, Gdynia, Poland

ABSTRACT: The main purpose of the paper is to recognize and characterize the substantial trends and ongoing phenomena as well as processes on the supply and demand side of the global ocean container market and then evaluate their impact on global supply chains and the whole mega logistics system. The author has analysed the dynamics of potential supply and effective demand growth on this market in the recent years and assessed changes observed on both market sides with respect to global logistics area. On this basis, the influence of global container market development on global logistics supply chains has been estimated. There were also presented and analysed the main effects of speeding-up implementation of disruptive innovations such as blockchain technology and digital trade platforms development in maritime container transport and trade sectors on the efficiency and effectiveness of global logistics chains and the whole logistics area. The issues related to the security of smooth digital development of container maritime transport and the mega logistics area were taken into consideration as well.

1 INTRODUCTION

The advanced globalization processes supported by economic deregulation processes and consequently, liberalization of all types of markets, in particular capital and freight markets, and consequently, also transport markets, generated a new dimension of global transport area. In the conditions of common logistics standards of managing the commodity flows and the development of global supply chains and networks, this area has strongly been anchored in the global system of logistics area. As a result, we can observe gradual real integration of TSL (Transport – Forwarding - Logistics) global sector, based on the formula of integrating its markets with commodity markets. This, in turn, leads to developing mechanisms facilitating the global trade transport service, provided under the standards of logistics efficiency of commodity flows (Branch, 2009).

Therefore, globalization, by building the global economy development potential able to function as one relatively consistent system in real time, develops at the same time the global transport and logistics area. In this sense the global economy can be perceived from the transport and logistics perspective, as a certain mega-system of the operating global supply chains and networks and logistics supply chains and networks linking the centres of production and consumption dispersed in the global area. The supply chains and networks cover within their scope all types of markets operating on a global scale. At the same time, they order all types of flows within these markets, optimizing them as per time and costs. In turn, these flows are linked in the physical sense and integrated by transport chains anchored in the system of transport and logistics infrastructure.

However, the integration of commodity and transport markets and consequently, the development of globally consistent transport and logistics area failed to reach the level of growth indispensable for the current stage of globalization process. It generates a number of adverse effects for all components of the global supply chain and thus, for the whole global economy. Consequently, both the operators of global supply chains and networks and the international economic organizations, such as: WTO (World Trade Organization), WEF (World Economic Forum), OECD (Organization of Economic Cooperation and Development), WB (World Bank), IMF (International Monetary Fund), UNCTAD (United Nations Conference on Trade and Development) and other, take various initiatives and actions to eliminate or reduce the existing barriers. Many of them are transport and logistics barriers, limiting the efficiency and effectiveness of the global trade service. Mostly these barriers constitute the subject of research provided in this study. Due to the frame of this article, the author concentrated solely on the maritime sector of the global supply chain, including freight markets as the real and potential source able to generate, in the time of crisis and instability, serious disturbances in the global supply chain operations and consequently, in the mega logistics area.

The main objective of this article is to identify the effects resulting from the imbalance between effective demand and potential supply on the global maritime container markets. To this end, the operations on these markets after the world crisis of 2008 and 2009 were analysed, indicating the main reasons for the stages of imbalance, methods of their measurement and actions taken by the global container operators leading to their gradual reduction or elimination. The grounds for research hypothesis, subject to verification by the author, provide that it is necessary to ensure further intensification of the said activities – investment as well as operational and organizational activities, and regulatory and coordination activities in the sector of maritime container transport, and also within the global transport and logistics. To fulfil the objective of the study and verify the accepted hypothesis the author used methods of economic analysis and qualitative research, supporting the process of inference with opinions and information presented in specialized reports of research institutes, such as: Alphaliner, DHL Logistics, Drewry and other international economic organizations.

2 GLOBAL MARITIME CONTAINER TRANSPORT AS A FACTOR OF TRADE AND LOGISTICS MARKETS DEVELOPMENT

At present, a significant role in the global transport as well as global logistics area is attached to the maritime transport, including its key segment, namely seaborne container transport. Maritime transport carries over 10.8 bn tonnes of cargo (2017), i.e. over 81% of the world trade volume. It is predicted that between 2018 and 2023, the average annual rate of growth of seaborne transport would amount to 3.8%. If this high rate of growth is sustained, then in 2020 this transport will increase to 12.5-13.0 bn tonnes, and in 2030 it might exceed 16.5 bn tonnes. (Mandryk

2011). Whereas, per transport performance unit, the share of maritime transport in the global trade services amounts to more than 92 % and is steadily increasing because of the growing volume and average distance of carriage. (ICS, 2017)

Maritime transport is also a dominant sector of transport in the global trade, if its share is measured by the quantity of goods carried per value units. Excluding the EU internal trade, it is estimated that nowadays its share in overall transport amounts to ca. 76 per cent. Whereas, including the trade within EU member states, as an integral part of global trade, it is estimated that at present the share of maritime transport in the world trade services based on export value totals 59 per cent. (Grzelakowski, 2018)

Assuming, under WTO data from 2018, that the value of global freight export in 2017 amounted to USD 17.73 bn, we can estimate that the value of maritime trade on a global scale reaching nearly USD 11.0 bn. [WTO 2018]. The value of seaborne transport, as defined above, has steadily been increasing – faster than the volume of exported goods. As a result, it is assumed that in 2023, maritime transport will carry goods worth at least USD 13.1 bn. \$. Consequently, it means that today the average value of one ton of seaborne cargo totals over USD 1,050 and within the last decade the tendency has steadily been increasing (however, between 2014 and 2016, we observed a significant decrease in this area).

Apart from the increase in prices and changes in the assortment structure of global trade and transportation, this tendency is significantly affected by the process of bulk-breaking and, first of all, containerization. Since the tendency is increasing, which refers to the development of logistic supply chains and networks demanding more rapid increase in the pace, timeliness and safety of supplies, the percentage of high-value goods in maritime trade is steadily increasing; nowadays, their share in global trade is estimated at min. 71 per cent of the value of global export, i.e. min. USD 12.7 bn. Assuming under the UNCTAD and WTO database that at present 17.1 per cent of the maritime transport volume and as much as 58 per cent of its value is transported in containers on a global scale, it is estimated that in 2017 this mode of transport carried goods worth USD 6.38 bn in more than 148 million TEU. The value can also be expressed with reference to the value of global production – its share totals USD 1 per each USD 15 of generated production. (Global Insight, 2016). It means that the average value of 1 ton of seaborne cargo exported in containers amounts to ca. USD 4,100 and is 4.1 times higher than the average unit value of cargo in maritime trade. (Grzelakowski, 2018)

Therefore, maritime transport ensures and creates, in the technical and operational as well as economic and financial terms, adequate transport and logistics potential indispensable for further undisturbed development of global trade, and consequently the increase in global economy. Intermodal transport plays a vital role in this respect – containerization as the carrier of globalization and leverage of global trade development as well as efficiency in the logistic supply chains operations. It results from that fact that nowadays the average costs of container carriage by

sea constitute only 3-4 per cent of the value of cargo carried by this type of transport and the cost of carrying 40" container with cargo at a distance of 1 nautical mile totals on average USD 0.10, which constitutes barely a fraction of costs of its carriage by road. As a result, on a global scale, the share of global import transport handling costs has been decreasing for over 20 years. Thus, between 2005 and 2017, the global trade volume was increasing on average by 3.8 per cent annually, and its value by 7.9-8.1 per cent, whereas the shippers' expenditure measured as per freight paid, was increasing on average only within 50 per cent of this value. The value of expenditure incurred by exporters and importers with regard to freight paid for the carriage of goods by sea is estimated nowadays at ca. USD 798 bn, which constitutes ca. 4.5 per cent of the global import in total and 6.7 per cent of the value of maritime transport goods determined per import. (UNCTAD, 2018)

3 GLOBAL MARITIME CONTAINER MARKET DEVELOPMENT - MAIN TRENDS AND MARKET PHENOMENA

The demand side of global maritime container shipping market, defined by the segment of commodity markets that are subject to regular, short- and medium-term fluctuations in time, is characterised by significantly high rate of change. The phenomenon is presented in fig. 1. (UNCTAD, 2018)

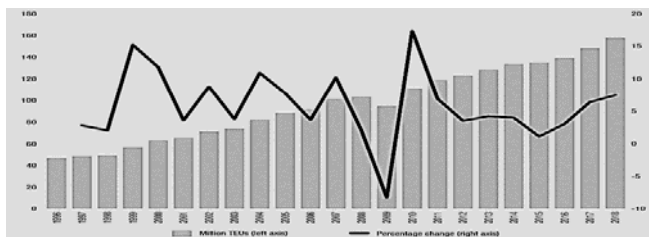


Figure 1. Development of maritime global container transport market and its dynamics between 1996 and 2018 (Million 20-foot equivalent units and percentage annual change). Source: (UNCTAD, 2018, p.13)

As a result of definitely higher rate of change in effective demand relative to potential supply of transport services on the container markets, the imbalance of these markets is in effect a common phenomenon. It is additionally deepened by the imbalance between commodity sequences at the majority of main container routes, which is presented in the specification below. As a result, the characteristic feature of these markets involves their permanent state of imbalance, expressed in the detachment of the demand side from the supply side. (UNCTAD, 2018 & WSC, 2018)

Table 1. Containerized trade on major East-West trade routes, 2014–2018 (Million 20-foot equivalents).

| | Trans-Pacific | | Asia-Europe | | Transatlantic | |
|-------|-------------------------|-------------------------|--|--|--|--|
| | Eastbound | Westbound | Eastbound | Westbound | Eastbound | Westbound |
| | East Asia-North America | North America-East Asia | Northern Europe and Mediterranean to East Asia | East Asia to Northern Europe and Mediterranean | North America to Northern Europe and Mediterranean | Northern Europe and Mediterranean to North America |
| 2014 | 15.8 | 7.4 | 6.8 | 15.2 | 2.8 | 3.9 |
| 2015 | 16.8 | 7.2 | 6.8 | 14.9 | 2.7 | 4.1 |
| 2016 | 17.7 | 7.7 | 7.1 | 15.3 | 2.7 | 4.2 |
| 2017 | 18.7 | 7.9 | 7.6 | 16.4 | 3.0 | 4.6 |
| 2018* | 19.5 | 8.1 | 7.8 | 16.9 | 3.2 | 4.9 |

Source: (UNCTAD, 2018, p. 15)

As a result of the surprisingly low rate of growth, ongoing since 2012, regarding the demand for containerized transport by sea (nearly ca. 3.5 per cent), at its significant fluctuations at the container markets dominated by the type of competitive oligopoly, we can observe significant fluctuations of freight and charter rates. The scale of these fluctuations is presented in fig. 2. (Alphaliner, 2018)

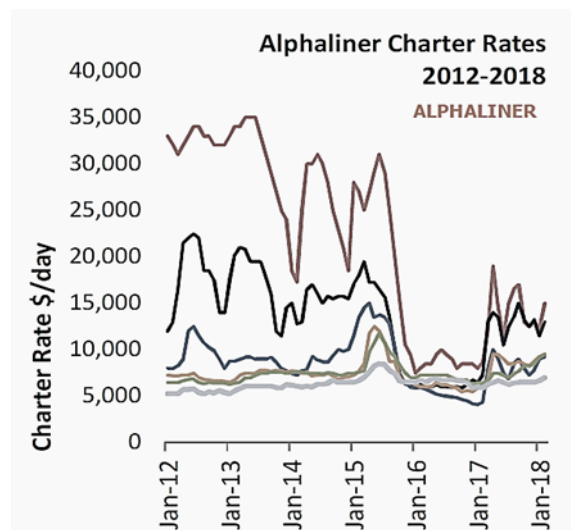
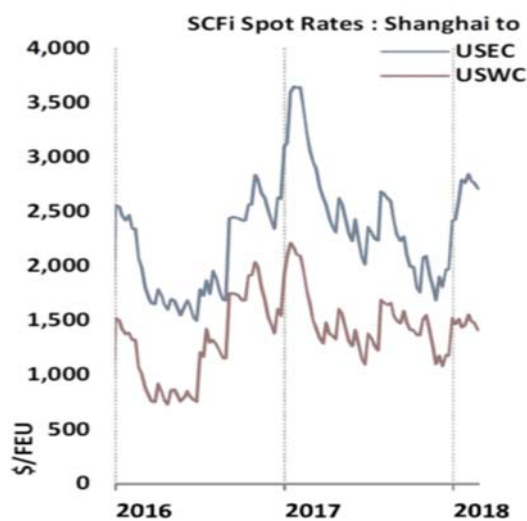


Figure 2. Freight and charter rates fluctuation on global maritime container market in the recent years. Source: (Alphaliner, 2018)

The phenomenon can clearly be observed in all segments of this market on a global scale, urging the container operators to maintain the accounting liquidity to avoid possible bankruptcy. These activities implemented by global container owners in the situation of significant market imbalance are

mainly expressed in actions aiming to reduce unit costs of tonnage operating and 1 TEU transport costs. Their implementation involves:

- 1 introducing into operation mega container ships (VLCC- Very Large Container Carrier) of over 18 000 TEU,
- 2 optimizing line services by limiting their number,
- 3 limiting competition through actions leading to horizontal integration of the sector and the market, which can be observed through frequent mergers and acquisitions, as well as establishing new shipping alliances,
- 4 expanding the scale of production and its diversification within the transport chain, to minimize the threat of bankruptcy through increased engagement of operations and capital in other components of global supply chain, and mainly the harbour sector – container terminals and other segments of global TSL (vertical integration of operational companies and the market).

The phenomenon of increasing concentration of the supply side and horizontal integration of the containerized trade market on a global scale is presented in fig. 3. (UNCTAD, 2018)

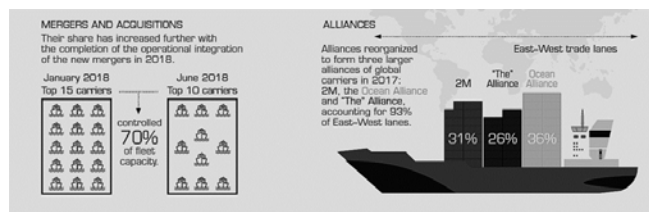


Figure 3. Global container market integration via ongoing supply side consolidation. Source: (UNCTAD, 2018, p. 44)

Such actions accompanied by the ongoing dynamic processes of horizontal integration, i.e. entity-wise integration, as well as tonnage and operational capital concentration, and important for the market, vertical integration conducted within the supply chain lead to changes in the traditional business models of global maritime container operators. The changes, occurring mainly in the group of 15 key leaders of the market, can be observed in the gradual departure from the confrontational model, i.e. total competition, towards a model based to a greater extend on cooperation. It takes the form of horizontal consolidation implemented within the formula of shipping alliances, as well as mergers and acquisitions, and vertical integration – by searching for new forms of connections with shippers and transport operators and logistics service providers within global supply chains. (Grzelakowski, 2018; WSC, 2018 and MDS Transmodal, 2018)

The ongoing entity-wise and structural changes of the supply side of global maritime containerized trade market and the behaviour of related operators lead to deep changes in the regulatory and distribution model of the market as well as allocation model (operational changes). Consequently, we can observe certain transformation of the previous type of market changing very dynamically at the main carriage routes – partial markets towards competitive oligopoly, and on a global scale, clearly towards duopoly. (Grzelakowski, 2018) The changes,

occurring within the most dynamically developing over the past 30 years global freight market - the market of still significant rate of growth and increasing value significantly affecting not only the harbour market but also other transport and global commodity markets - exert more and more influence on the area of global supply chains and networks. As a result, they co-determine the efficiency and effectiveness parameters of global transport area and consequently the mega logistics area. (WB, 2016)

4 GLOBAL TRANSPORT AND LOGISTICS AREA. ITS EFFICIENCY AND EFFECTIVENESS STANDARDS

From the logistics perspective, global economy can be perceived as mega-system of transport and logistics connections determined by actively operating supply chains and networks and logistics supply chains and networks. The system is based on the existing infrastructure combining the centres of production and consumption dispersed in the global area. The global logistics network is a physical structure of the suppliers and recipients logistics services on a global scale, integrating the economic area in all aspects. The logistics network spread within global spatial system, as the mega logistics system with its most important transport segment, is continuously adapting to new market conditions, integrating globally fragmented commodity and transport markets, including freight and other markets. (Chopra & Meindl, 2010)

The quality of global logistics area perceived through the efficiency and effectiveness of global trade commodity flows, functioning within the supply chains and networks in this area, is conditional upon numerous factors. They determine costs and time incurred by the shippers, and consequently by the consumers of goods carried within the existing global logistics supply chains and networks – including sea-borne goods. The transport and logistics costs as per direct and indirect costs which occur in the export relation of global supply chain are in general terms presented in fig. 4. (WB, 2018)

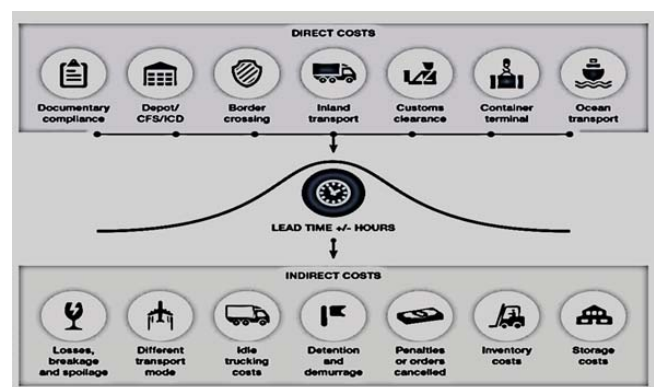


Figure 4. Direct and indirect transport and logistics costs in the global land and maritime supply chain Source: (WB, 2018).

The factors and costs are subject of analyses conducted by the World Bank who significantly highlights the element of infrastructure and quality of

transport and logistics services, as two of the most frequently indicated barriers to the increase in effectiveness of global logistics area. It also refers to its transport segment and improved efficiency of global transport and logistics markets, as well as their quality. (WB, 2018 and WEF, 2018). A group of these factors related to particular parameters used to provide partial rankings of logistics macro-areas, is presented in fig. 5. (WB, 2018)

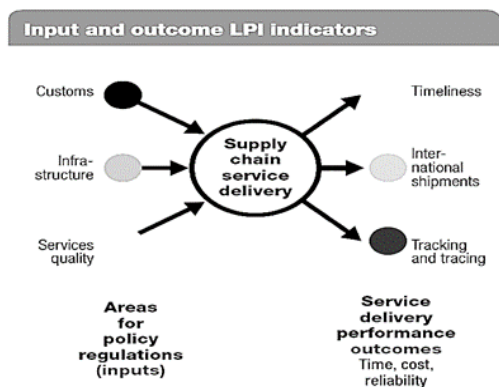


Figure 5. Set of factors and indicators defining the efficiency of global supply chains and global logistics area. Source: (WB, 2018)

Among these factors, key importance from the perspective of the subject analysed in this article, refers to transport and market elements, such as: maritime and logistics infrastructure, quality of logistics services, timeliness, international shipments as well as tracking and tracing. They primarily determine the level of direct and indirect costs – as the function of sea-borne container shipping time. Only multifaceted actions taken by global container operators focused on improving the parameters defining the level of logistics efficiency within each of these factors lead to the increased efficiency and effectiveness of global transport and logistics area. They also provide grounds for introducing innovative solutions in the sector of maritime logistics based on unified standard defined by market regulators and shipping operators.

5 DIGITALIZATION OF THE MARITIME SECTOR AND OTHER ACTIONS TAKEN BY GLOBAL MARITIME CONTAINER OPERATORS AIMED AT IMPROVING THE QUALITY OF MEGALOGISTICS AREA

Nowadays, digitalization proves to be the main challenge for global container operators. The cost of collecting information on tariffs and transaction costs for the carriers is extremely important since global logistics market is still dispersed. There is no publicly available standardised payment algorithm, and the flow of transactional documents is too large. According to Maersk Line, these days, the supply of frozen goods from East Africa to Europe requires the involvement of nearly 30 people and organizations, and comprises over 200 various forms and types of communication. The documentation and bureaucracy in this situation constitute even one fifth of the total cost of container transport. (DHL, 2018 and ICS, 2018)

As a result, the market is less competitive and controlled by service providers, which, in turn, forces the recipient of services to look for information from various sources and compare the prices offered by different service providers. If there is no common information field, crucial data such as details on available space on ships of various container operators is unknown. It reduces the effectiveness of rendered services and raises their price in mega logistics area. In this context, there is a real need to introduce blockchain technology. (DHL, 2018 and MDS Transmodal, 2018)

Blockchain is a decentralized transactional platform in the dispersed network infrastructure. It will facilitate the management and tracking of tens of millions of containers worldwide through digitalization of global supply chain processes. The technology provides synchronized audit of all activities in the global logistics chain in real time. Such audit helps to build mutual trust and facilitates taking decisions since all parties to the transaction conducted within the global supply chain have equal access to the transaction-related information. (Alphaliner, 2019)

The introduction of blockchain technology, even at the basic level, ensures security of data and significantly eliminates the possibility to provide incomplete or incorrect information in the sector of global logistics. Therefore, it is possible to track all shipments in real time, from the first shipping point to the delivery to the recipient (fig. 4). The traditional documentation is replaced with smart contracts, unnecessary agents are eliminated from the process, and global logistics sector becomes much more decentralized. It helps not only container operators but also all other participants in the global logistics chain to reduce the probability of errors and malpractice, and save time and significant costs they have to incur today (billions of euro). (DHL, 2019)

Global container shipping, like other modes of transport, is also part of the e-commerce supply chain. However, to the extent which remains unclear in view of the relatively small share and participation of alternative modes of transport. Nevertheless, global ocean container shipping is expected to contribute to e-commerce products, which rests on the building of inventories near consumption markets. For shipping, in order to tap the trade potential arising from e-commerce, operators need to adapt the leverage supply chain solutions that are e-commerce-friendly. Such actions are already taken by many leading global container operators. (ICS, 2018)

So CMA CGM has been heavily investing in the Chinese logistics market for a few years. In 2018, the company signed a cooperation agreement with Alibaba – the largest e-commerce platform in the world. As a result, goods ordered via OneTouch platform of the Chinese concern are transferred on board the container ships of these companies operating between Asia and the Mediterranean, and Asia and the Adriatic. Therefore, the Chinese exporters can eliminate the involvement of forwarders in the commodity transport from Qingdao, Shanghai, Ningbo and Yantai to the Mediterranean ports in Barcelona and Valencia as

well as Adriatic ports in Rijeka, Koper, Trieste and Venice. (WSC, 2018)

Meanwhile, Maersk established a global-range trade platform with IBM, to accelerate the commodity flows in the world trade and help to save billions of dollars. In 2019, nearly 100 companies and organizations joined the platform, comprising e.g. ports in Singapore, Hong Kong, and Rotterdam, customs offices in the Netherlands, Australia and Perry as well as Pacific International Lines (PIL). (Alphaliner, 2019)

So these days, we shall admit that the most important element in the sector of global maritime transport, and in particular container shipping necessary to unlock the potential of digitalization is to develop instruments able to increase the standards of freight market operation in the global logistics area. These instruments, more commonly applied and more and more efficient these days are digital trade platforms based on blockchain technology, strongly integrating global containerized transport markets with global commodity markets.

However, their dynamics is significantly hindered by cyber-attacks, classified in general as ransomware attacks. Ransomware is a form of malicious software from the area of cryptovirology which may block access to computer system or make it impossible to read computer data (frequently through encrypting techniques) and then demand a ransom payment to restore the system. In 2017, such attack was launched at the number one global container operator, Maersk Line and cost ca. 300 million USD. In 2018, also Cosco Shipping Lines suffered a hacking attack and felt its consequences in the shipping and harbour sector. (Alphaliner, 2018, DHL, 2018)

This is a significant risk limiting the possibilities to achieve results in facilitating the global logistics area through more effective, ICT-based integration of commodity markets with global maritime container markets. It is also likely that cyber-crime will postpone the launch of unmanned ships for at least a few years, which will halt the process of reducing logistics costs and improving the quality of global logistics area operation.

6 CONCLUSIONS

Today, the container shipping industry is cautiously embracing relevant technologies arising from digitalization. More and more, leading global carriers and freight forwarders alike are taking measures to digitalize internal processes, develop integrated information technology infrastructures and offer real-time transparency on shipments. Digital start-ups such as Xeneta, Flexport and Kontainers are being launched. These solutions aim to provide user-friendly online interfaces for shippers, while facilitating processes and enhancing transparency.

Recent developments relating to blockchain technology aimed at facilitating seaborne trade flow within the global transport and logistics area are also important. Other technologies of relevance to global container market, world seaborne trade and global logistics environment include robotics, artificial

intelligence and additive manufacturing or three-dimensional printing (3D). Some leading representatives of the global container sector argue that digital technology could save \$300 in customs clearance costs for each consignment and that it could potentially generate \$ 5.4 millions in saving on each shipment associated with a ship that has a capacity of 18,000 TEUs

Rate quoting is an important component of supply chains but it's definitely not the only one. As mentioned previously (comp. fig. 3), customs clearance and documentation, temporary warehousing, final mile delivery and so much more emphasizes the importance and need for forwarders. But at the same time, all of these components are often done in silos and thus the processes become inefficient.

As a result, digitizing freight forwarding as well as the rest of the global supply chain is very important. Once built, "the digital supply network" will offer a new degree of resiliency and responsiveness enabling container shipping companies that get there first to beat the competition in the effort to provide shippers with the most efficient and transparent service delivery. Summing up, it can be concluded that, digitization takes the beauty of the automated quoting process and adds the accuracy, guaranteed integrated technology to reduce process costs within the global logistics supply chains. In addition, add in a professional forwarding team and local connections to assist with exceptions may eventually create a digital or virtual forwarder able to creatively change the global logistics area via enhancing its quality standards.

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