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BOOKING PLATFORMS AS A DISRUPTOR AND ENABLER IN THE LOGISTICS INDUSTRY

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A WOLF IN SHEEP'S CLOTHING OR A BLESSING IN DISGUISE?

Auteurs:
Gerwin Zomer (TNO, Senior Business Consultant)
Maret Hoesen (RSM, student MSc Supply Chain Management)
Rob Zuidwijk (RSM, Professor of Global Supply Chains and Ports)

Summary

This report addresses the key question of what is the impact of (booking) platforms on the freight forwarding industry. To answer this question, the research has explored the rise of platforms in logistics, the types of platforms that are relevant to the sector, the importance of added value services and the extent to which service providers can use them to distinguish themselves from the competition. Based on desk research, interviews with stakeholders, a survey, and three consecutive expert sessions, we have touched upon the essential roles and functions of a freight forwarder and have analysed if, how and to what extent these are distinctive from new digital forwarders entering the market.

In our preliminary analysis, we explore a variety of platforms and owners of these platforms. This helps us to classify the various platforms and to explore their disruptive nature.

We discuss how the rise of digital platforms triggers some freight forwarders to reinvent their value proposition, while other freight forwarders claim distinctiveness of their current value proposition. Important aspects of the value propositions under discussion are: (1) account management and customer intimacy; (2) the ability to handle exceptions effectively and efficiently; (3) the extent to which the management of hinterland complexity, customs complexity, and supply chain services at large are scalable.

Conclusions on these matters are: (1) customer intimacy as offered by traditional freight forwarders may support a comprehensive service package and create a peace of mind with the customer, but digital freight forwarders seek to provide a comparable customer experience by using advanced information services; (2) Hinterland complexity may be reduced by transparency in service offerings via e.g. Navigate; and (3) Customs complexity may be addressed by the use of machine learning, e.g. the use of HTS classification converters such as Ai Dock, 3CE Technologies, E2Open.

In some segments, forwarding is strongly related to other supply chain activities, such as port call optimization or specific logistics asset management. This has implications for the organization of the forwarding and the disruptive power of new digital forwarders. Some shippers in the liquid bulk industry perform the freight forwarding service themselves due to specificity of their logistics chains, for instance port call management. Other shippers in the horticultural industry, for example, maintain very close and long-term relationships with their logistics service providers as some logistics processes are of strategic value, such as the handling of returnable packaging. The market segment of SME shippers is contested; freight forwarders may bring value to shippers that are small and less IT savvy. At the same time, some digital platforms seek to embrace SME shippers and claim to offer easy access to useful and affordable freight forwarding services. Not all shippers enjoy the prospect of a lock-in with a specific platform provider.

Digital platforms are well positioned to benefit from the digital transformation in logistics. The advancement of data analytics and machine learning brings automated decision support features of digital platforms. The role of big data in global trade management is important here; machine learning methods are data hungry and performance depends on the quality of master data. Rule based modelling may help to better organize the handling and positioning of empty containers, enhance revenue management of spare capacity of carriers, better handle demurrage and detention, and manage documentation for import and export.

We recommend that freight forwarders do not take their distinctive competitive position for granted. The aforementioned distinguishing factors can be overcome by advanced information services that make use of big data and data analytics, including AI. The development of such advanced information services on logistics platforms that add value is a topic of further research.

Exception handling, for instance, may involve minor issues with documentation next to major disruptions. The question is whether exception handling is scalable, i.e., whether repeated handling can be done against very low or zero marginal costs, which would help create the network effect.

Prescriptive analytics and artificial intelligence (AI), in combination with end-to-end visibility, may support effective automation of administrative procedures in supply chains. For example, trade compliance may be automated to a large extent by advanced information services that make use of AI, once the associated liability risks can be controlled. Currently, such liabilities inhibit the use of AI in this domain and the legal aspects of platformization is a topic that needs further exploration.

We recommend freight forwarders to keep up the digitization pace using new digital technologies such as advanced data analytics. Moreover, they should apply customer centricity in their value driven service offering and adapt their business model accordingly.

Integrated multi-platform solutions can not only offer sound supply chain solutions for shippers, they can also help accelerating the digital transformation in port logistics and transform Port of Rotterdam into a smart port that is ready for two major transitions: (1) The digital transformation; and (2) The decarbonization of global maritime transport networks.
The potentially disruptive impact of booking platforms on the freight forwarding industry will not only affect the value proposition of some freight forwarders, but also the strategic position and role of freight forwarders, including their power relationships with other actors.

Concluding, platformization in freight forwarding can certainly become a wolf in sheep's clothing for traditional freight forwarders that slowly digitize their processes and fail to adapt their business model by using new digital technologies such as advanced data analytics. But at the same time platformization can be a blessing in disguise for traditional freight forwarders that embrace the digital transformation. It allows them to develop customer centric services and expand their service portfolio.

This may have impact on the market structure, mid-sized traditional freight forwarders observe more pressure from new digital forwarding entrants. Platformization in forwarding is not expected to have considerable impact on the logistics competitiveness of The Netherlands as such. But it may have implications for Dutch added value, through leakage of value-added activities towards large international digital forwarding players operating on a global scale.

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Introduction

1.1 Background & Problem Formulation

There is a common belief that digital technologies are likely to disrupt the logistics industry. In particular, the rise of digital platforms is believed to challenge existing business models in the logistics and freight forwarding industry and that new business models will take over.

The Netherlands has 320,000 people working in freight forwarding, of which a substantial part is closely linked to international freight moved via the port of Rotterdam. Therefore, the potential impact of digital platforms on the freight forwarding industry is of great importance to stakeholders directly involved in the industry, but also for the logistics sector and society at large.

As put forward by Accenture (2017), new entrants will disrupt the logistics industry. Observation is that new entrants are able to and will opportunistically use digital technologies, for example, to more efficiently match demand for and supply of logistics services, enhance customer experience, and improve logistics costs and service offerings. Arthur D Little (2017) explains the potential of digital platforms to disrupt the logistics industry and recognizes a number of archetypical platforms. This articulates the important observation that there is a variety of digital platforms in the logistics industry. Moreover, the digital platforms and new business models are propagated by a variety of actors, both incumbents and new entrants.

Somewhat in contrast with the above, Deloitte (2019) observes that, as opposed to cases of B2C markets for travel, hotel and taxi services, digital platforms have not (yet) transformed B2B logistics and freight forwarding industry. None of the actors, neither incumbents nor new entrants, have yet been able to transform the industry by the deployment of digital platforms.

The impact of digital platforms could be diverse. First of all, the strategic position, the role in the value chain, the value proposition and services of freight forwarders may change. The logistics industry at large may also be affected, for example in terms of employment and the value add (of the Dutch logistics sector) and several dimensions of the Logistics Performance Index (LPI) may be affected.

We formulate the following problem that we aim to address in this report.
The impact of digital platforms on the logistics and freight forwarding industry remains inconclusive, despite the common belief and experience that digital platforms have the ability to transform industries. There is a need to further explore this impact while recognizing that there exists a variety of digital platforms and a variety of actors that propagate the use of digital platforms. The impact needs to be assessed in terms of the business model of freight forwarders and the performance of the logistics sector as a whole.

Both SmartPort and Fenex have articulated the need to address this problem with the suggested focus on booking platforms and the impact on the freight forwarding industry. In order to position and explore this particular impact better, we will consider the somewhat wider scope of the impact of digital platforms on the logistics industry.

1.2 Research objective and set-up of the report

Based on the problem formulation in Section 1.1, the main research question reads:

What is the impact of (booking) platforms on the freight forwarding industry?

In order to arrive at an answer to this question, which is the objective of this research, we deploy a methodology as described in Section 2, and discuss a number of important topics.

We describe the strategic position, role and services of a freight forwarder in Section 3.
We make an inventory of digital platforms relevant to the logistics industry based on the features that the platforms provide, the actors that develop and use the platforms, and the business models that underlie the platforms in Section 4.

Although we will specifically focus on booking platforms, to better understand the impact of digital platforms, we do acknowledge the variety of platforms. We also discuss how and the extent to which various actors contribute to the impact of digitalization. In particular, the role of new entrants and electronic forwarders such as Flexport and Cogoport will be discussed in detail, but also the role of incumbent companies that vertically integrate, such as Maersk and DP World.

This will allow us to propose a classification of these platforms that are applied in the logistics industry. We will then provide a preliminary discussion on how these aspects are impacted by digitalization and digital platforms in particular.

Our preliminary findings are topic of reflection with our interviewees as discussed in Section 5. In Section 6, we report on our survey results held among freight forwarders on impact of digital platforms and other game changers in the industry. In Section 7, we report on our focus group sessions with freight forwarders, and digital forwarders together with shippers.
In the analysis of the impact of digital platforms, some important notions will receive attention, such as scalability and the use of standards.

So, based on our analysis, we will explore the impact booking platforms are likely to have on the freight forwarding sector in Section 8. The impacts can be diverse and we will explore consequences for logistics market organization and the strategic position and business model of freight forwarders, but also a broader impact analysis, which includes consequences for employment and overall performance of the logistics sector, as measured by the Logistics Performance Index (LPI), in Section 9.

We conclude and provide recommendations in Section 10.

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Approach and methodology

Smartport, the collaboration between the Rotterdam port community and several knowledge institutes, and Fenex, the Dutch freight forwarder association, initiated this project on the impact of digital platforms on the freight forwarding industry and business. Smartport asked TNO and Rotterdam School of Management, Erasmus University (RSM) to jointly investigate this phenomenon[1].

The challenge in this research is to cope with the multitude of different opinions and viewpoints in order to come up with a neutral interpretation of the impact of platformization in freight forwarding. Platformization refers to the adoption of software tools that enables a lot of other software to communicate and share data across systems along value chains. We did this by combining qualitative and quantitative methods in a layered approach, in which we started with desk research to understand the platform phenomenon and to have a good knowledge base to guide the interviews. This phase was followed by semi-structured interviews, in which we shared literature findings and collected opinions and viewpoints from a broad range of stakeholders. In total, twelve interviews have been conducted with freight forwarders, shippers, carriers, and digital platform owners. The interviews started with questions about the current strategic position of freight forwarders, followed by questions on information exchange within the business process and whether processes can be automated with a focus on arranging bookings online. After that, the use of digital platforms and the impact of the developing platform ecosystem were discussed.

In addition, we performed a survey on digitization, digital platforms, and a broader range of possibly disruptive developments or possible game changers in order to assess the impact of platformization in the context of these broader developments. The survey was sent to the members of Fenex, and 73 respondents completed the questionnaires.

The findings obtained have been used to create three focus groups, and we organized discussion sessions with them. Two focus groups involved digital freight forwarders and shippers and another focus group consisted of freight forwarders. During these sessions, the results of the survey and multiple propositions were discussed to elicit the opinions of the participants and to create a discussion among them. This helped us to develop a more in-depth understanding on the matter.

1 The project is led by Gerwin Zomer, Senior Business Consultant at TNO, and Rob Zuidwijk, Professor of Global Supply Chains and Ports at RSM, Erasmus University. Part of this research is based on the MSc thesis written by Maret Hoesen, Supply Chain Management student at RSM, Erasmus University (Hoesen, 2020).

Finally, we used a disruption assessment framework to consolidate these findings, answer the main research question and draw conclusions on the impact of booking platforms on the freight forwarding industry. This layered approach is being visualized in Figure 1.

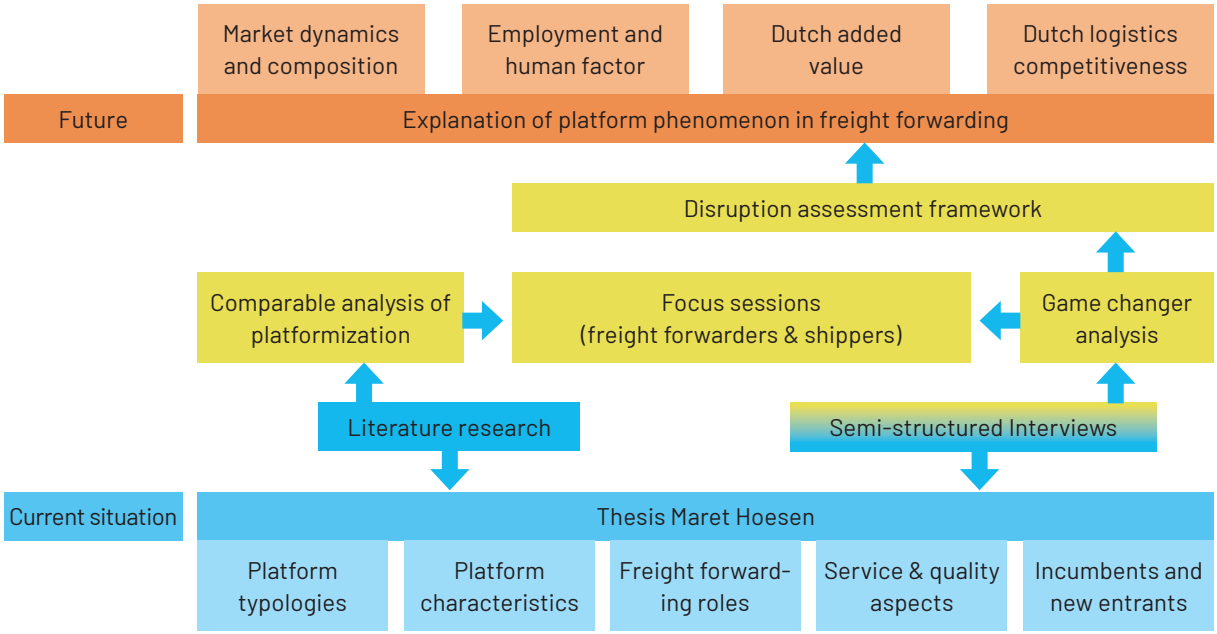

Figure 1: The layered approach applied in this research

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Elaboration of the forwarding role and functions

The freight forwarder is considered the "architect of transport" and acts as an intermediary between shippers and handling agents to organize carriage of goods (Schram, 2012). Freight forwarder tasks include giving advise on the best transport and logistics options, packaging of the goods, customs clearance, compliance with regulations, carrier choice, arrange all documentation, and so on.

Freight forwarders traditionally have no assets and their task is to undertake transportation on behalf of the sender of the goods (Hofmann and Osterwalder, 2017). Supply chains have become increasingly global, therefore freight forwarders have broadened their focus (Parimala, 2013). The role of freight forwarders is changing into a logistic service provider, since freight forwarders are offering additional services and supply chain integration. These services can include, for instance, advising on import regulations, export clearance, assisting in inventory management, and arranging cargo insurance. In order to provide this extensive set of services, freight forwarders are in contact with airlines, shipping lines, truckers, customs, insurers, and worldwide agents (Hoessen, 2020).

In the following sections we will elaborate on some typical roles and functions that came across in interviews with freight forwarders and may distinguish traditional freight forwarders from digital forwarders. Here we position digital forwarders not as freight forwarders that may use digital platforms for some of their services, but more as companies that focus on the use of digital platforms to provide their freight forwarding services. We will nuance this in Section 4.2, where we discuss several types of owners of digital platforms. In Chapter 8 these claims are being reconsidered based on the focus session discussions.

3.1 Exception handling and account management

One potential distinguishing factor between a traditional freight forwarder and a digital freight forwarder relates to customer intimacy. The traditional freight forwarder will personally manage the account and build a trust relationship with his client. The client, the shipper, should feel confident that the freight forwarder will do everything that is necessary to ensure that his goods will arrive on time and good order with the consignee, and that any issues along the way are taken care of effectively. In other words: The shipper has "peace of mind" in confidence that the freight forwarder has the ability to handle non-standard bookings, to avoid or solve issues by finding alternatives when there are complications or disruptions in the supply chain. The claim is that digital forwarders provide efficient information services that will allow the shipper to articulate his needs and obtain freight forwarding services, but non-standard services may not be available and it is not evident that disruptions will be managed properly.

3.2 Hinterland complexity

Another potential distinguishing factor is the capability to manage the complexities of hinterland transportation. Hinterland complexity refers both to the variety of options to transport and forward goods between port and locations inland, but also to the number of organizations involved in the import or export of goods. The number of documents (easily dozens) that need to be exchanged in the process also reflect the complexity.

Not all organizations involved in hinterland transport are IT savvy and well-connected to platforms. The traditional freight forwarder may be better equipped to set up an intermodal hinterland route with reliable partners. Even if a digital platform provides an efficient route and is able to make the corresponding bookings, the question is whether a reliable delivery of service can be guaranteed.

3.3 Customs complexity

Customs complexity is reflected by the amount of time and effort needed to identify the relevant rules and regulations and to comply accordingly. International supply chains source from and bring products to markets in many regions, each with their own rules and regulations, while import and export regions may or may not have trade agreements. For each import, the nature of products and their components may be scrutinized based on regulations on e.g. health, local market and taxation. Compliance needs to be verified and demonstrated, requiring proper knowledge of local rules and regulations and awareness of opportunities from trade agreements and other exemptions. Such brokerage may be beyond the capabilities of automated services provided by digital forwarders.

3.4 Value adding services

Next to the aforementioned distinguishing features, traditional freight forwarders may provide other value adding services that may distinguish them from digital freight forwarders. Relevant knowledge on packaging of particular products, expertise on financial settlement and insurance, sufficient connections with logistics service providers to effectively consolidate freight, are example value adding services, which traditional freight forwarders may provide, and that digital forwarders may not be capable of.

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Digital platforms: other domains and classification

4.1 Digital Platforms in other domains

Digital platforms have disrupted several industries, in particular B2C markets. Well-known example is the music industry, where new entrant Spotify is dominating the market. Spotify is market leader in music streaming industry, with Apple and Amazon as main competitors, while music streaming dominates distribution of music by other media. Search engines as developed by Google have created entirely new markets, where users trade their time and attention, which can be exploited by advertisers, for the convenience of finding items of interest on the Internet. Many social media applications have copied this business model. The hotel industry has been transformed by digital platforms such as Booking.com. Together with Expedia, Booking.com completely dominates online sales of hotel rooms in Europe[2]. Digital platform Airbnb developed a substantial market share in the online rental of vacation homes, but faces serious competition from Booking.com.

In the mobility industry in the US, Uber is competing with other ridesharing companies such as Lyft, while ride sharing competes with taxi and car rental services. In the US, ride sharing has obtained a dominant position compared to these services[3].

In retailing, digital platforms have fostered on-line sales, which is growing faster than brick-and-mortar sales, but is not yet dominating the market. E-commerce platforms hosted by companies such as Amazon and Alibaba not only provide a sales channel to brands, but also vertically integrate the supply chain, to be discussed in this report.
Digital platforms have also emerged in B2B markets. For example, in the automotive industry, OEM (Original Equipment Manufacturer) may use platforms for purchasing and online sales to dealerships. However, these OEMs face competition from digital players in obtaining revenues from information services. The development of connected and automated transport creates opportunities for platforms that provide information services for data sharing and other digital mobility services[4].

Digital platforms have not yet transformed the healthcare industry (Accenture, 2018). The incumbent health care providers apparently have been able to keep new entrants and new developments at bay, while patient experience has not changed considerably in the past 20 years. With surging medical costs due to aging and new technological developments, this is likely to change. In particular, prevention and telemedicine are important developments that open the door to information services provided via digital platforms. As in the automotive industry, reluctance by the incumbent players in the medical industry to act on these opportunities may trigger new entrants to invade and take over.

2 https://www.phocuswire.com/Booking-com-and-Expedia-take-four-out-of-five-agency-bookings-in-Europe
3 https://www.businessinsider.com/uber-lyft-are-gaining-even-more-market-share-over-taxis-and-rentals-2018-7
4 See for example: https://c.europa.eu/growth/tools-databases/dem/monitor/content/race-automotive-data-digital-platforms-versus-automotive-manufacturers

The logistics industry at large has also faced the advent of digital platforms. As we will analyze the role of digital platforms in the logistics and freight forwarding market in more detail in the next section, we will focus here on the role of smart cargo as a platform for value adding information services. This will allow us to make a comparison among industries, where either patients, vehicles or cargo units help establish platforms with information services for digital ecosystems of users.

The smart container is associated with transport chain visibility and cargo visibility for reefer containers. The container monitoring and sensor devices establish identity, location and cargo condition of the container. These devices, embedded in an Internet of Things, become quite powerful in creating value through e.g. supply chain visibility and customs compliance, transport efficiencies by dynamic routing of cargo and repositioning empty containers, and cargo security (UNECE, 2019). As such, the "container journey" triggers information services that can be hosted on a platform where shippers, logistics service providers, authorities and other stakeholders act as users on a multi-sided platform (Van Alstyne et al., 2016).

In comparison, a "patient journey" in a healthcare system is also progressively monitored by monitoring and sensor equipment to enable medical services at a distance in order to lower treatment costs, increase diagnostic speed and increase treatment quality (Accenture, 2018).
In the logistics industry, there exists a large variety of digital platforms that play different roles. Some platforms help source transport capacity, others enable the booking of transport, while platforms may also coordinate logistics communities or provide end-to-end visibility; see Table 1. In the next section, we will start classifying these platforms while focusing on the freight forwarding industry.

Table 1: Digital Platforms in the Logistics Industry

Container Transport Booking . Flexport . Shypple . Freightos . Cogoport . Compose (shipper cooperation) . INNTRA . myKN . Maersk.com	**Port platforms (to accelerate market uptake)** . Portbase: Transaction data exchange in port community . Cargotracker (Boxinsider): Container milestone management (event data) . Navigate: Hinterland services . PortXchange (PRONTO): Port Call Optimization . NEXTLOGIC: Terminal planning for inland vessels . TEUBooker: An online booking platform for container hinterland and interterminal transport (barge & rail) . DELIVER: Connecting platforms for multimodal freight / end-to-end visibility & trade finance . Port IoT platforms: Hydro/meteo system and Container 42 . TRADELENS: Information sharing and collaboration across supply chains underpinned by blockchain
Road transport . Transporeon . Quicargo . Instafreight . Transporeon . Uturn . Quicargo . Sennder (recently acquired Uber Freight Europe)	

4.2 Owners of platforms that offer freight forwarding services

Consulting companies like Arthur D Little (2017), BCG (2018) and Deloitte (2019) reflect on actors that offer freight forwarding related services via digital platforms, and roughly the following types of actors can be discerned, and we make a categorization accordingly:
(1) start-ups or new entrants (Flexport, Cogoport, Freightos, Google);
(2) forwarding incumbents that have started to offer some of their services on a platform (DHL - Saloodo, K&N – FreightNet/KNLCL, DB Schenker - Connect4Land);

(3) suppliers/carriers (Maersk - TWILL, DP World – DF Alliance);
(4) integrators (Fedex, UPS);
(5) large customers with platforms (Amazon, Alibaba, Walmart).

This also aligns with the observation by Hofmann and Osterwalder (2017) that new entrants, suppliers, buyers and providers of substitutes can pose a competitive threat.

One question that emerged from the various discussions we had was:
Which type of actor is seen as the most threatening to traditional freight forwarders and can make the biggest impact on the freight forwarding market by the deployment of a digital platform?

Start-ups and new entrants can operate completely on-line which might give them a competitive advantage. Also, in the interviews it is mentioned that some new entrants benefit from large investments by venture capitalists, which enables them to create advanced platforms and offer competitive freight forwarding services. Elbert and Gleser (2019) and BCG[5] confirm a huge inflow of risk capital to start-ups in the logistics sector, which push innovations and disruptive business models.

Forwarding incumbents that have started to offer some of their services on a platform, such as DHL and Transporeon, or Kuehne + Nagel that has created its own platform (MyKN), are considered a lower threat than digital booking platforms like Flexport. These players are creating a digital platform to offer their current set of services to their current customers. As such, the development of these platforms are considered less disruptive for the freight forwarding market.

Freight forwarders do, however, feel the pressure from the *vertical integration of carriers*. Several shipping companies, such as Maersk, have in-sourced freight forwarder and customs brokerage capabilities and have developed strong digital capabilities[6]. As asset owners and global players in the transport industry, and through vertical integration, these shipping companies are in a very good position to monitor and manage the movements of goods throughout global supply chains. These companies form a threat to the market of freight forwarders.

Integrators such as Fedex and UPS already offer supply chain visibility for their supply chain customers. In this respect, they can be considered less disruptive, similar to the large incumbent freight forwarders.

Large customers with digital platforms, such has megaretailers Amazon, Alibaba and Walmart, have obtained market dominance via the platform economy, and they can vertically integrate the supply chain from the customer side. These companies have the resources to forcefully enter new markets using their platform capabilities, and as customer of freight forwarding services, they are in a good position to do so. For example, Amazon, which launched a digital freight brokerage website (freight.amazon.com) might become particularly large and dominant in the freight forwarding market.

During the interviews we also discussed what kind of *combinations of actors* have the potential to become successful through platform deployment. A new entrant can collaborate with a (large) freight forwarder in order to gain the experience, expertise and connections. The freight forwarder can in turn use the network effect the platform creates. Also logistics platform solutions complement each other and jointly offer integrated end-to-end supply chain solutions for shippers. For example, Flexport,

5 https://www.bcg.com/publications/2018/digital-imperative-container-shipping
6 https://www.maersk.com/news/articles/2020/09/02/ap-moller-maersk-completes-the-acquisition-of-khg-customs-services

Yellowstar and Slimstock[7] together offer an integrated and interconnected solution for order management, stock control and freight forwarding for shippers such as Blokker. Another possibility is that a new entrant uses an existing supply chain visibility system. For example, Flexport is using Crux to get data sets of terminals to improve the track and trace capabilities for its customers. Interoperability platforms, such as Deliver, provide opportunities to consolidate platform services. Deliver is a blockchain-based platform that connects between different platforms in the logistics ecosystem and facilitates information exchange. By linking shippers, shipping companies, freight forwarders and other organizations involved in global transportation, paperless shipment of goods is enabled on a large logistics network.

4.3 Viable business models

We can distinguish four viable business models that may impact the freight forwarding industry:
(1) digital markets that match demand and supply of logistics services;
(2) supply chain visibility systems in support of logistics services;
(3) data analytics in support of logistics services; and
(4) digital forwarding systems.

This overlaps with the archetypical representation of digital business models of start-ups that emerged from a cluster analysis by Möller et al. (2019).

Digital markets provide viable matches between suppliers and buyers of logistics services. The digital platform may provide information services that support progressive stages in the marketing and sales funnel. For example, Navigate[8] supports initial stages by providing a complete overview of the most efficient deep sea, short sea, rail, and inland shipping routes to shippers and freight forwarders, which simplifies the choice of modality and carrier. Carriers can use it to compare their offerings to the ones of competitors, and as a marketing tool to attract potential clients. Especially booking via digital marketplaces would enhance market transparency and facilitate an efficient booking process.

Supply chain visibility systems provide stakeholders with information about the status of supply chain processes, assets and goods and enable tracking and tracing. In order to do so, it facilitates information sharing among supply chain actors. Digital freight forwarding systems make use of supply chain visibility systems, such as Infor Nexus[9]. Some systems provide visibility in a particular part of the supply chain or transport chain. For example, collaborative platform PortXchange[10] helps to optimize planning and to execute and monitor activities during a deep sea port call. Aligning parties that are involved in the port call improves efficiency and can also reduce emissions. A freight forwarder benefits from an optimized port call and can streamline its business process better with the information the platform provides.

Data analytics can be used to analyse, coordinate and optimize supply chain processes in support of logistic services. Example capabilities are prognostics that make use of historical data and current status of the supply chain and decision support that help improve the supply chain. Data analytics can support timely and efficient operations by means of dynamic planning, but also evaluate viability of matches between shippers and carriers. As a result, freight forwarders can use data analytics in various ways, including optimal pricing, tracking and tracing, and planning.

7 https://www.supplychainmovement.com/blokker-containers-from-the-far-east-no-longer-arriving-unexpectedly/
8 https://rotterdam.navigate-connections.com/voyages
9 https://www.infor.com/products/infor-nexus
10 https://port-xchange.com/

Digital forwarding systems offer freight forwarding services online. A digital forwarding system can either be set up by an incumbent or new entrant. An increasing number of freight forwarders are starting to offer their current services in a digitized way, including digital handling of required documentation. Freight forwarders that make use of these platforms need not form a significant threat to other freight forwarders, as they do the same business as before but now offer their services digitally. New entrants may be able to scale their services, since they can operate completely online, and are henceforth more likely to create strong network effects. Hofmann and Osterwalder (2017) distinguished 3PL value chain activities: Transportation and warehousing, logistics management services, customized value-added services and customer relationship management. The authors conclude that platforms are more likely to support logistics management services and customer relationship management, while customized value-added services are less likely to be offered by platforms. The discussions during our workshops were less conclusive on this matter. Incumbent freight forwarders strongly believed they could distinguish themselves from digital platforms by providing specific and comprehensive services to their customers, while some digital freight forwarders believed they would be able to offer such services as well through online customer support.

4.4 Strategies to prevent disruption in forwarding

Deloitte (2019) observed three derivatives of platformization in forwarding:
(1) niche platforms which offer a particular set of services in a market niche;
(2) regional ecosystems that offer a comprehensive set of interrelated services; and
(3) digital forwarders that make use of digital capabilities to enhance freight forwarding services.
In this section we elaborate on the three derivatives and describe if they can be used to prohibit platform disruption in logistics industry.

Niche players will not be disrupted as much as players that offer standard services. The shippers included in the research are operating in specific sectors, in liquid bulk and horticulture sector. The freight forwarding services in these sectors meet many requirements. Shippers believe that for packed goods, booking platforms can add value by providing the possibility to choose between multiple carriers. For more complex products, shippers do not believe digital booking platforms can add much value. The transportation of liquid bulk, for instance, has many complicated requirements and there are only a few parties that are able to execute this type of transportation. Also, for horticulture shippers, it is complicated to use digital booking platforms due to the time-critical chain, low volatility in carriers, and the complexity of organizing the transport of returnable transport items. However, the freight forwarders and shippers included in this research do believe that digital platforms might be able to develop and offer these services in the (near) future.

Regional ecosystem platforms owned by the leading digital players are likely to grow and add freight forwarding services. These platforms bundle digital solutions with a uniform information and application system and build a so-called cross-cutting ecosystem (McKinsey, 2019). Think of large platforms like Google or Alibaba entering into European forwarding. Shippers might decide to choose for the platform instead of the traditional freight forwarder. As such, this derivative may have a disruptive impact on the forwarding sector.

The last type that can overcome these barriers are incumbents who succeed in digitalizing their business. Due to the existing relationship between the freight forwarder and customers, customers do most likely prefer to operate with freight forwarders and carriers they know and trust. Many shippers are reluctant to entrust their goods to an unknown carrier (Evofenedex, 2020). Therefore, incumbents might have an advantage compared to new entrants regarding the willingness of shippers to work with a platform.

Freight forwarders need to create a smart strategy to hedge against the disruption of digital platforms. Especially, mid-sized traditional forwarders that offer standard services will be impacted by the development of digital platforms. According to Homchant (2019), this type of freight forwarders will be left out if they do not adapt to digital transformation. In order to compete with the market competition originated from these platforms, freight forwarders need to distinguish themselves. A freight forwarder can differentiate on the following aspects in order to compete with the intensified market competition originated from digital platforms:
(1) Internationalization of activities (Hofmann and Osterwalder, 2017);
(2) offering a comprehensive set of interrelated services in a regional ecosystem (Deloitte, 2019); and
(3) service range and customization (Hofmann and Osterwalder, 2017).

We may conclude that there are several strategies to cope with the possible disruptive impact of platformization in the forwarding industry. In order to better understand these coping strategies, we elaborate in the next chapter on some typical forwarding roles and how these are being impacted by the rise of digital platforms.

4.5 A freight forwarding taxonomy for platformization

The impact of digital platforms on individual freight forwarders may depend on the type of freight forwarder in question. Elbert and Gleser (2019) created a taxonomy for freight forwarders based on multiple dimensions and characteristics; see Table 2. Freight forwarders differ in these dimensions, like customer base, contract relationship, quoting, areal focus and modal focus. Some types of freight forwarders probably will be more affected by the development of digital platforms in the market compared to other freight forwarders. For example, platforms are aggregators which work best in highly fragmented markets and in Western Europe, the road freight market consists of 300,000 carriers[11]. Therefore, platforms might create bigger network effects there than on less fragmented markets. So Table 2 below may be used to guide the impact assessment of freight forwarders depending on their characteristics.

Table 2: Dimensions and characteristics of freight forwarders (Elbert and Gleser, 2019)

Customer base				
Shippers				Other forwarders
Freight Capacity Supply				
Direct Carrier Registration		Established Freight Network		Own Capacity
Access Model for Customers				
Direct Web-Access		Contract Logistics		
Contract Relationship				
Spot-based		Recurring		
Quoting				
Instant-Quote		Not explicity stated		
Areal Focus				
International		Regional		
Modal focus				
Sea	Air	Rail	Road	Storage

11 As stated in https://www.bcg.com/publications/2018/why-road-freight-needs-go-digital-fast


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-05-
Interview findings

5.1 Interviewees

The persons that have been interviewed for this study are presented in the table below.

Table 3: List of interviewees

Name interviewee	Company	Interviewee role	Organizational Unit/ Organization
Astrid Buijssen	Shell	Business lead digital transformation	Liquid bulk trade and supply
Ad Schoenmakers	Ritra Cargo	Director	Freight forwarder, non-asset based
Inge Lucassen	Maersk	Portfolio manager 4PL	Maritime shipping line
Irma van der Weijden	Embassy Freight	Sales & Operations manager	Freight forwarder, non-asset based
Jan van Casteren	Flexport	Vice President Europe	Digital freight forwarder
Carmit Glik	Cogoport	Europe CEO and managing director	Digital freight forwarder
Peter de Groot	Cargill	Regional supply chain lead Europe	Liquid bulk trade and supply
Jean-Paul van Munster	Trans Ocean Pacific	Founder CEO	Freight forwarder, non-assed based
Michiel van Veen	Royal Lemkes	Operations and supply chain director	Horticulture trade and supply
Martin de Ruiter	Royal FloraHolland	Drive lead	Horticulture trade and supply
Oscar van Veen	Port of Rotterdam	Digital business solutions	Sea port
Marten van der Velde	Portbase	Director Strategy and Innovation	Port community services
Donald Baan	Portbase	Manager business development	Port community services
Martijn Spee	Ricoh Europe	Manager Transport operations	Electronics

The interviews were semi-structured along the following topics: digitization, experience with and opinion on digital platforms in logistics and impact of the emergence of digital platforms. The key findings on these aspects are being discussed in the following sections

5.2 Digitization

Digitization gives companies many opportunities to improve logistics costs, reliability, flexibility, and sustainability (Kayikci, 2018). To digitize, integration and standardization of processes are needed. The

interviewees certainly shared the opinion that there is an urge for standardization. Currently, freight forwarders have developed digital structures to connect with some of their customers. Whether these costly structures are built often depends on the size of the customer and the customer's preference of working digital. Also with carriers, freight forwarders are likely to have different ways to interact with them. The information exchange is not entirely digitized and only with some carriers there might be an interface. Many carriers in ocean freight use INTTRA to plan, book, and track shipments from one software system, but when a freight forwarder is operating in several modalities, this already means it has to deal with different interfaces.

5.3 Experience with and opinion on digital platforms in logistics

Digital platforms like INTTRA can help companies to accelerate standardization and digitization. Therefore, the interviewees were asked about their use of platforms and their opinion about the effect of platforms on the logistics industry. The freight forwarders are currently using various digital platforms, like Portbase or Cargonaut. The use of platforms depends on the function and objective of the platform. For instance, freight forwarders are likely to use platforms that aim to improve and facilitate information exchange. They are less likely to use platforms that match supply and demand like digital booking platforms. Freight forwarders see the potential of applications on platform that enhance their services, e.g. where customers can log in to see the progress of their shipment. The freight forwarders clearly stated the difference between new entrants that are *"digital freight forwarders"* and *"freight forwarders that are digitized"*.

At the moment, digital booking platforms seem to mainly ship standard containers. According to freight forwarders, expertise and knowledge are needed to handle non-standard bookings. These bookings imply for example transportation of bulk or include 'exceptions' such as a flat rack, an open-top container, a door-to-door booking, or deviating Incoterms. Moreover, when there are delays during transportation, freight forwarders have the opinion that they can take responsibility and have more ability to solve the issues or finding alternatives compared to digital booking platforms.

The shippers included in the research also are using several digital platforms. The platforms that were mentioned are PortXchange, TransFollow, and Compose. The platforms share the same objective to facilitate the process of sharing information between stakeholders. The reason why these shippers do not use online booking platforms (yet) can be explained by the complexity of the industry they are operating in. Shippers in liquid bulk mentioned the many restrictions for shipping liquid goods which makes consolidation complicated. This makes it less attractive to create a platform in liquid bulk goods. Moreover, shippers in this industry are very careful in choosing logistics service providers and carriers to guarantee the safety and to keep control of the shipments. Also in the horticulture industry, there are many requirements regarding temperature, quality, and safety. Besides, the organization of Returnable Transport Items (RTIs) can be quite complicated. For those reasons, shippers in horticulture mainly have long-term relationships with logistic service providers and prefer not to use a digital booking platform. Digital platforms might not add much value in complex sectors, thus in the opinion of the shippers digital platforms are more likely to be used for packed or containerized goods.

Shippers would like to see digital platforms to develop services to help improve supply chain sustainability, through providing visibility and insights in environmental footprint (improvements) throughout the logistics chain: "*The so-called early adapters, on the other hand, are very happy with the platforms. They do not primarily use them to reduce costs, but with sustainability in mind. Some are even willing to pay more if transport becomes significantly more sustainable.*" (Evofenedex, 2020)

5.4 Impact of the emergence of digital platforms

Digital booking platforms provide software to shippers and carriers which can help them to improve their planning and to use assets more efficiently. These platforms act as chain directors by coordinating between different parties across the chain and provide visibility to them. Customers can log-in on the platform and get real-time information on item level. If a customer requires this visibility and the freight forwarder does not provide this service on an application or a platform, the communication goes via phone or e-mail. Ryan Peterson, CEO of Flexport, even says that *"Some of 40% of all calls to freight forwarders are customers inquiring about their goods' whereabouts"* which is unquestionably time-consuming. Furthermore, digital booking platforms can advise customers on how they should design their supply chains. The available data platforms offer many opportunities to improve customers' supply chains. For instance, it can give visibility on which links in the supply chain are consistent in delivering goods, or where in the chain the most exceptions and errors occur. Hence, using digital booking platforms brings several benefits for shippers and carriers in terms of visibility, freight costs, empty miles, and minimization of waste.

Whether shippers are going to switch to a digital freight forwarding platform seems to be dependent on the type of goods shipped and the size of the shipper. Goods with many restrictions regarding transport are less likely to be shipped with the help of a platform. Although if platforms develop in these complex supply chains, and are able to comply with the requirements they can become more interesting for these shippers to use. The size of a shipper is also an important aspect of whether to use a platform or not. The shippers included in this research expect that especially the small—and medium-sized companies benefit. Smaller shippers can benefit from advanced services that become accessible to them, while large shippers have more power and probably already have competitive prices with their current providers.

Besides the digital booking platforms, freight forwarders also feel the pressure from vertical integrations of shipping companies. Freight forwarders see shipping companies as much more dangerous for their position compared to digital booking platforms. As mentioned before, freight forwarders can differentiate from digital booking platforms with their knowledge, expertise, and exception management. Whereas, several shipping companies have bought large chains from freight forwarders and are trying to take over the role of the freight forwarders. The data which shipping companies obtain from large volumes of shipments can become very valuable. By structuring and visualizing the movements of the goods flows, they can offer a better service towards the customers. Therefore, shipping companies that focus on freight forwarding services in combination with digitization also form a threat to the market of freight forwarders.

-06-

Game changer analysis & survey findings

In order to better understand the possibly disruptive impact of platformization in freight forwarding, we cannot isolate this from a number of other potentially disruptive developments. Therefore, we developed a survey on possible game changers, new technologies, processes or business models that present a significant change from the main stream tools, methods of practice and processes that have dominated the industry for decades, if not centuries.

The survey consisted of multiple statements about game changers in logistics and the impact of digital platforms. The participants could fill in whether they agreed certain aspects are game changers. It contained statements about e-commerce, digitization, big data analytics, artificial intelligence, Covid-19, sustainability, blockchain, Internet of Things, 3D-printing, and changes in chain liability as possible game-changers. Results are presented in Figure 2.

The majority of the participants think that most of these aspects, except for 3D-printing and chain liability, are seen as possible game changers. Digitization of messages, documents, and declarations seem to be the most important game changers in this survey. In the interviews, similar results can be found since many game changers which interviewees mentioned were related to digitization. Digitization is going to help share information more efficiently, make the market more transparent, and help provide advanced information services, while using technologies such as Blockchain, big data analytics and artificial intelligence.

The survey also addressed the market dynamics in freight forwarding. The participants were asked to what extent they expect fundamental changes in the competition for forwarding services from new platform entrants as well as vertical integration from other logistics players. Results as presented in Figure 3 compare opinions about the disruptive nature of new entrants versus incumbents.

Moreover, the survey included a number of statements and participants were asked their opinion. The results are presented in Figure 4. Not surprisingly, forwarding processes are expected to further digitize, though not all participants are yet well prepared for the digital transformation. The interviews and expert sessions revealed that whereas most forwarders are prepared for paperless processes, some of them lack capabilities to fully benefit from applying advanced data analytics and automate decision making.

The large majority of the participants in the survey believe that parties offering freight forwarding services via digital platforms will compete with freight forwarders and will profoundly change the freight forwarding market. They recognize the added value booking platforms can bring and most of them expect to make use of platform services themselves. However, many freight forwarders also think that digital platforms fail in managing exceptions and are not able to provide the same service as traditional freight forwarders.

Figure 2: Survey results on game changers.

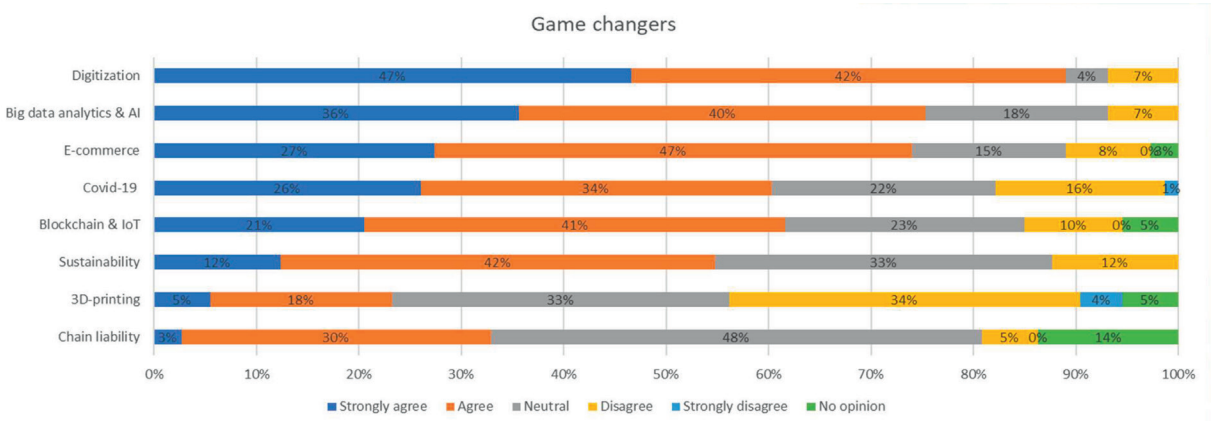


Figure 3: Survey results on market dynamics

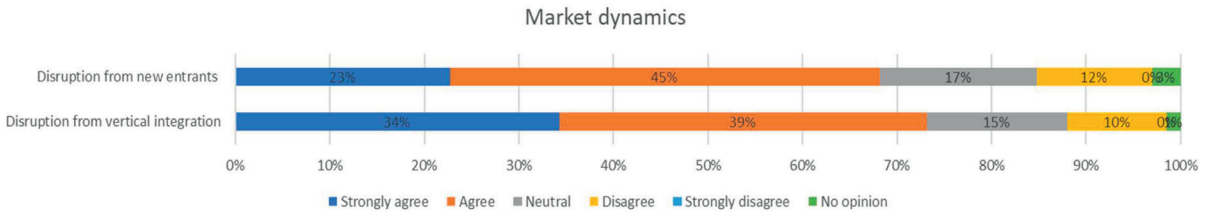
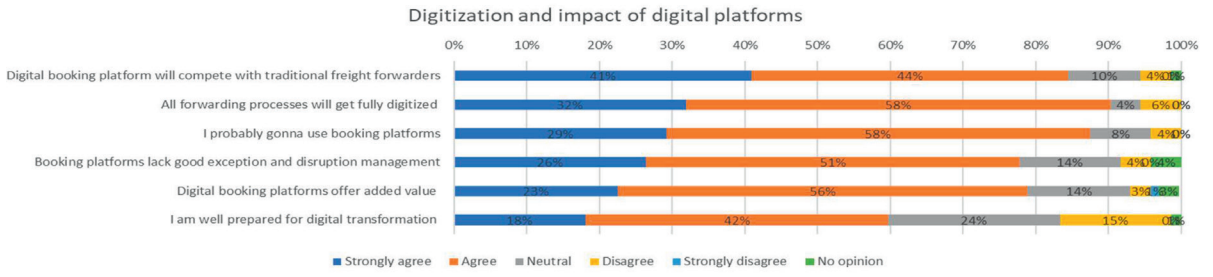


Figure 4: Survey results on impacts.



-07-
Expert session findings

The interviews provided us with opinions, and sometimes contrasting views. Therefore, we considered that group discussions and confrontations with contrasting views could help discover further nuances in statements and opinions or better understanding the contextual differences for certain points of view. We have chosen for one focus group with freight forwarders of different sizes and two focus groups including a digital freight forwarder and a number of shippers with different supply chain characteristics. The focus group sessions took place in a digital environment (Teams), as a consequence of the Covid-19 restrictions.

In the first expert session, a number of freight forwarders debated the impact of digital platforms on their industry. In the two consecutive workshops, Flexport and Cogoport discussed with shippers the extent to which freight forwarders can effectively use digital technology to meet the wishes of their customers.

7.1 Focus group 1 with freight forwarders

The expert session with focus group 1 participants took place on September 17th 2020 with the following participants.

Table 4: List of participants in focus group 1

Maarten Mol, manager Ocean Freight	Mainfeight
Wesley van Karsbergen, LCL Operations Manager	DB Schenker
Nico Zonne, Managing Director	Euro Forwarding BV

The incumbent freight forwarders in this session are familiar with the current developments and explain that they see opportunities to improve the business. They can either connect with some platform functionalities to improve their services or do not feel that new entrants or other incumbent players, such as maritime carriers, pose an immediate threat to the position of the freight forwarders that are able to meet the challenges ahead. This requires freight forwarders to be agile. The global freight forwarders in-source the required capabilities, while the smaller players are flexible and can adapt. The mid-sized companies may be at risk as they are "caught in the middle".

Digital platform may very efficiently offer basic services, but experiences are that many customers need services beyond supply chain visibility. One can argue that supply chain visibility offered by digital platforms offer is a commodity. Freight forwarders, digital or not, cannot provide visibility as a distinguishing service. Some shippers that have large volumes use digital platform services offered by global carriers as they apparently seek low-cost vanilla solutions and accept that exceptional cases are not handled with the required care.

We enquired about a number of areas where freight forwarders potentially are able to distinguish themselves: (1) hinterland complexity; (2) complexity of customs brokerage; (3) account management; (4) supply chain visibility.

General opinion was that *hinterland* is the least complex of the three, but that nonetheless, booking platforms have not yet captured this market, so that freight forwarders remain to have a role to play there.

Customs complexity may be out of reach for digital platforms as a highly automated service, but this may change over time. One of the reasons that customs brokerage cannot be automated easily, even if it is technically feasible, is the huge risk exposure due to non-compliance penalties. Venture capitalist are less likely to invest in digital platform that are exposed to such risks. In this respect, there is a difference between the US and European market. In the US, carrier haulage is dominant which allows for more standardized solutions. In Europe, despite the customs union, there is more variety in regulations, and there is more merchant haulage, which complicates matters even further.

Account management includes customer intimacy and the commitment of the service provider to take responsibility for delivery of service as promised. Some customers have regret using standard booking services, which are easy to use but do not provide comprehensive handling of exceptions. At the moment, supply chains are run by people, so to arrange matters, one still needs to connect with people: "it's a people business". This may change when supply chains are progressively run by computer systems.

According to the participants, *tracking and tracing* capability not necessarily works in favor of its supplier; it requires up-time of the technical devices and raises certain expectations of the customer, creating additional work load for the freight forwarder that not necessarily adds value. The data also poses a liability; it may be misused if it falls in the wrong hands.

The discussion concludes on a proper response of the freight forwarding industry to the rise of digital platforms. Freight forwarders should carefully consider the capabilities of digital platforms and make use of them where value can be added.

7.2 Focus group 2 with digital freight forwarder and shippers

The expert session with focus group 2 participants took place on October 2nd 2020 with the following participants.

Table 5: List of participants in focus group 2

Carmit Glik	Cogoport
Rudmer Kemper and Ronnie Vos	Avebe
Luca Senis	Dow chemicals
Stefan Heeringa	Evofenedex

As compared to other shippers, larger shippers are able to create supply chain visibility by means of their own SAP systems, i.e., not through third party platforms, and connect directly with shipping lines, etc. Digital platforms may try to offer real-time visibility as a value proposition, but big shipper is looking for intelligent alerting. For example, dynamic transit time management while facing large volatility is time consuming; here AI may support ETA prognostics, etc. Shippers may choose to insource supply chain optimization and contract forwarder merely as a booking agent to connect with multiple carriers.

However, there is room for freight forwarders to offer advanced services such as sustainable logistics through managing footprint. The use of digital platforms is hampered by lack of interoperability; for example, shipping lines processes are not harmonized as they use proprietary booking form standards.

Digital platforms observe opportunities to become an aggregator; platforms winning strategy is to connect all players in a secure way. A landscape of platforms (Romochkina, 2020) exists, competition between platforms will hinder interoperability but also help create technological advancement such as AI enabled smart containers. Carriers are not yet investing in these technologies as much as one may expect.

Large shipper did a pilot smart containers (temperature screening) and observed that exception management was lacking. This is not acceptable, since buyers need to be confident about the reliability of the shipper. This is not only a technical but also an organizational problem. A freight forwarder with global reach can help a lot in responding to exceptions.
SME shippers have less capacity to insource the particular capabilities and they need an intermediary to connect with service providers, for example to manage demurrage and detention, i.e. complexity of hinterland logistics, offer purchasing power with large carriers, knowledge about customs procedures, etc. SME's do not mind making a phone call or sending an email; many SME's do not see the need to digitize. The set-up costs to digitize their business and engage with a platform are too high, given their small volumes.

Many SME shippers are not IT savvy and would need a "plug-and-play visibility solution". The platform is able to provide this and actually has a focus on SME's; through standardization of processes, taking care of business and handling exceptions is scalable!

SME shippers rely on the freight forwarder if something goes wrong with customs procedures. Large shippers are multi-nationals and have strong relationships with the respective customs organizations and insource customs brokerage.

The digital platform argues that customs brokerage is easiest part to automate! However, real world is pretty messy and cross-border trade certainly is, and there is also risk exposure to non-compliance claims. DHL uses AI to tackle 80% of their declarations and involve an insurance company to manage the risks involved.

7.3 Focus group 3 with digital freight forwarder and shippers

The expert session with focus group 3 participants took place on October 6th 2020 with the following participants.

Table 6: List of participants in focus group 3

Jan van Casteren	Flexport
Niels van Dongen	Abott Labs
Lennart Heip	Dow chemicals
Nanne Schriek	Evofenedex

Shipper needs freight forwarder to provide a peace of mind by committing to service delivery as promised. Even traditional freight forwarders have difficulty to live up to those expectations.

Large shipper recognizes how freight forwarders act on exceptions, but insufficiently offer peace of mind. Especially lean supply chains are in need of that. Shipper either insources freight forwarding or works closely together with freight forwarder, since the shipper manages its own supply chain. Shippers are reluctant to share their data with a platform as re-use of data cannot always be avoided.

A freight forwarder: (1) coordinates complexity; (2) creates a margin between purchasing and sales of logistics services; and (3) provides visibility. A freight forwarder needs to commit to timely delivery of the goods. Freight forwarder adds value by (1) ensuring quality data for supply chain visibility; and (2) coordinate complexity by connecting the various systems; (3) create peace of mind when required.

Digital platform argues that creating peace of mind is scalable! Freight forwarding services need to be customized to supply chain and product specificities. For example, manage cargo ready dates of suppliers by backtracking ultimate delivery date, and select appropriate logistics service, based on data driven business rules. Redesign of supply chain is not scalable – this is where consultants come in, but managing day to day operations based on data is.

For SME shippers, a digital freight forwarder may act as a traditional freight forwarder. Solution are provided using web interfaces that do not require shipper IT systems, and those systems offer advances information services for supply chain management.

Some booking platforms work with poor quality data, and this obviously deteriorates their performance. Booking platforms may also act as data broker, and perform analyses and alert upon exceptions based on the data; the shipper will manage his supply chain accordingly.

Data analytics can be used to manage complexity of customs brokerage, although there is the risk of non-compliance penalties. AI may play a role in reducing these risks, but this requires substantial data to train the systems properly. Advanced analytics in customs procedures uses supervised learning.

Platform need to connect upstream data sources with downstream processes where quality data is required. For example, PO information needed for export HS-code classification.

The responsibilities of a traditional freight forwarder may disperse among various entities, such as shipper (insourcing) and digital platform (automation). Platform may take the role to provide visibility, while customs complexity and commitment to quality logistics service may require human intervention.

Data is progressively becoming a tradeable asset, where platforms will help create efficient markets. But there are still a lot of questions and issues to resolve in order to create an efficient market for data. Shippers want to remain in control of their data. Ownership of data is not always self-explanatory, for instance who owns container milestone data? Is it the operational process owner (carrier or terminal), the sensor solution provider, the freight forwarder or the cargo owner?

-08-

Impact on strategic position & business model freight forwarders

In this section, we discuss which aspects of freight forwarder role, freight forwarding activities and value proposition are affected the most by digital platforms. Overall, a digital forwarder can offer the same functional spectrum as a classical forwarder while using a digital platform to handle processes and required document exchanges (Dietrich and Fiege, 2017). Nevertheless, the interviews and focus group sessions highlighted different perspectives on the following aspects: exception handling and account management, hinterland complexity and customs brokerage complexity. Claims on possible distinctiveness being raised in chapter 3 have been reconsidered, based on the in-depth elaborated discussions in focus sessions.

8.1 Exception handling and account management

In both the interviews and focus groups, we observed various opinions about whether digital freight forwarders can offer "exception handling" in a similar matter as traditional freight forwarders. For more complex products or supply chains, such as tradeable liquid bulk or the horticulture sector, shippers do not believe digital booking platforms can add much value. For example, the transportation planning of liquid bulk requires coordination of subsequent activities linked to a port call, such as pilotage, surveillance, notification and confirmation of readiness to berth at a specific terminal. This coordination role is generally not being taken up by freight forwarders, therefore large shippers manage this port call process themselves. A logical consequence is that they also in-source the corresponding freight forwarding activities. In the horticulture sector, the complexity is in handling dedicated logistic equipment, such as Danish trolleys. Most road transport operators offer additional logistic services, such as collecting and repositioning of trolleys, resulting in strong partnerships between growers, wholesalers and those logistic service providers, making it hard to penetrate the forwarding market for new entrants.

A traditional freight forwarder cannot compete on price with platforms, but can compete on providing services for bookings with non-standard requirements and when shippers expects peace of mind with timely and safe delivery of the goods. The strategy of digital forwarders is to make 'where-is-my-shipment questions redundant by offering end-to-end visibility services and to anticipate on supply chain disruptions with upstream visibility and execute alternative transport solutions, thus creating a 'peace of mind' for the shipper. As soon as digital platforms can provide the same service level while handling exceptions as compared to traditional freight forwarders, platforms will have a significant impact on the position of freight forwarders. The underlying question is whether providing forwarding services that include proper exception handling and help create piece of mind are *scalable*, i.e., whether such services can be provided against very low marginal costs when offered at a large scale.

8.2 Hinterland complexity

Hinterland complexity can be overcome by offering the multiple options in a transparent way. For example, the Navigate tool can be used as a multimodal route planner providing information on various performance aspects of the routes displayed. The platform does not provide the booking capability itself. The tool also provides information on empty depots, which helps to plan the return of empty containers. Other examples of platforms that provide visibility on hinterland connectivity are given in Table 7. Various EU projects have funded such service transparency initiatives; see for example Marco Polo[12] and Motorways of the Sea[13].

Table 7: Platforms that provide hinterland visibility

Hinterland visibility platform
Navigate – Port of Rotterdam Intermodal Solutions & Connectivity Platform – Port of Antwerp
Intermodal Planner – Port of Amsterdam
Simply Deliver
WOLF platform – HUPAC Intermodal
Starflow – Yellowstar
Intermodal Links – Ecorys
AGORA Intermodal Terminal database

Booking platforms aim to use these hinterland platforms and develop decision rules and algorithms to select the best route, departure time, carrier, demurrage conditions, and other specifics. As such, this distinctiveness claim is not so distinctive when mobilizing the power of platforms to create hinterland service transparency.

8.3 Customs complexity

Customs complexity involves the amount of time and effort needed to identify the relevant rules and regulations and to comply accordingly. Next to the complexity of ensuring that all documentation is available to fulfill all procedural requirements, certain administrative processes simply take a lot of time and effort. Therefore, automation of such processes is the way forward to reduce associated costs considerably. For example, finding the right customs code for a product (HS code) can take considerable time, while the process can be automated with manageable error rates under human supervision. AI can be used to make educated guesses in matching product with HS codes under human supervision and learn along the way.

There are quite a few global trade management systems and other platforms that incorporate (artificial) intelligent information services that help manage the complexity of customs compliance; see Table 8. The extent to which such automated services can compete with traditional freight forwarders in providing reliable customs brokerage is debated. Obviously, automated services will be more efficient, but the question is whether the consequent error rates are acceptable and whether supervision of automation is effective. The risk of non-compliance is aggravated by the relatively large fines that are incurred. So despite the contribution of AI in compliance management and standard customs declaration filing,

12 See https://ec.europa.eu/inea/en/marco-polo

13 See https://ec.europa.eu/transport/themes/infrastructure/motorways-sea_en

customs brokerage will remain the coming years a distinctive capability of traditional freight forwarders with customs brokerage.

Table 8: Platforms and solution providers that incorporate (Artificial) Intelligence into customs brokerage services

GTM Software	**Other solution providers**
3CE Technologies E2Open (Amber Road: GTM software) OneSource Smart HS (ThomsonReuters GTM)	Aidocks (The Dock Innovation Hub) Tradiance (Zisser Customs Law Group) Servient (Legal & compliance big data platform) SimplyDuty.com GHY Classify (used by governments) Dutch Customs Administration (see Giordani, 2018)
E-commerce platforms Alibaba Amazon	

8.4 Value adding services

As mentioned in Section 3.4, there are a host of value adding services that traditional freight forwarders can provide, while digital forwarders are not necessarily in a favorable position in providing such services by means of digital capabilities. Examples include the provision of freight consolidation opportunities, storage and warehousing expertise and knowledge on value added logistics such as packaging and labelling. However, there are also value adding services that are enabled or enhanced by digital capabilities, such as tracking and tracing and supply chain visibility, efficient invoicing and payment, standard insurance services , and so on. Also, the range of adding value services that can effectively be supported by means of digital technologies is growing. So both groups have opportunities to offer different ranges of value added services, that fit into a more customer centric approach.

-09-
Broader impact analysis

9.1 Disruptiveness

Digitalization has a big potential to create value in logistics. In most cases data and information is exchanged by phone or email and platforms can facilitate information sharing. Trade cost reductions expected from full implementation of cross-border paperless trade are estimated at 10-30% of existing transactions costs, depending on the current state of paperless trade development in the participating countries. Significant benefits in terms of trade compliance are also expected (UNESCAP, 2016). Regarding the current use of digital platforms, Transport Intelligence (Ti) published The 2019 Global Freight Forwarding report[14] and shows that 49% percent of surveyed shippers have already used an online forwarding platform. In the same article, a prediction is made that 18.7% of volumes will be booked online by 2023. If these predictions are correct, digital platforms will have a large impact on the logistics sector. However, only 16% of the members of Evofenedex uses platforms to ship freight and 72% of the participants does not even expect to start using a digital platform within one year. To what extent shippers are willing to use and see the advantages of digital platforms in logistics is a bit questionable given these statistics.

Due to the importance of digitalization, it is most likely digital platforms will grow in the next few years. According to Cusumano et al. (2019), companies with a platform business model have the potential to have a winner-takes-all outcome, which means that a platform captures the majority of users from competitors. The question is whether this will also happen in the logistics sector.

Guo developed a measurement framework for assessing disruptive innovations (Guo, 2018). This framework includes a number of features, grouped into three categories: technological features, market dynamics and external environment aspects. The definition of the corresponding aspects are presented in the table below.

Table 9: Aspects that are likely to determine the impact of a disruptive innovation (Guo, 2018)

Dimensions	Aspects	Definition
Technology	Integration	Degree of the innovation merges with existing paradigms, i.e., higher level of integration means a more sophisticated deed of the innovation
	Leadership	Potential of leading related technological developments, deployments and applications
	Maturity	Maturity and reliability of the supporting technologies or the related infrastructures, especially during the early introduction of the innovation
	Diffusity	Easiness of diffusion of the innovation among its target audience
	Simplification	Realising certain functions that improve the satisfaction of clients through simplification of technologies
Marketplace	Niche market	Introduction of the innovation via occupying the new niche markets
	Value Network	Profitability of upstream, downstream and all other collaborative firms associated with the innovation

14 See https://www.ti-insight.com/product/global-freight-forwarding/

	Cost reduction	Reducing the cost of acquiring certain functions, services or products, that is, introducing the innovation through the low-end markets
External	Policy	Scale of policy-related impact on development and adoption of the innovation, both positive and negative
	Macro-economics	Influence of macroeconomic situation on the development and adoption of the innovation

This framework has been applied to the role of (booking) platforms in the Dutch freight forwarding sector, using among others the input from the interviews and desk research to feed the assessment framework. The results are summarised in the table below.

Table 10: Application of the framework of Guo (2018) on the freight forwarding industry and digital platforms

Dimensions	Aspects	Booking platforms	Justification
Technology	Integration	Low	Booking platforms are standard marketplace technology. Advanced platform services such as AI customs declaration generator is integrating big data with platform technology.
	Leadership	Low	So far limited major players are behind new entrants, except for Uber (Uber freight, Transporeon) and Google Ventures (Flexport). Contrary to IBM & Maersk behind Tradelens, for instance.
	Maturity	Moderate/High	Platform cloud technology is proven in other domains, while AI services on top are in their infancy.
	Diffusity	Moderate/High	Depending on the target market, for standard container bookings diffusity is rather high, in niches such as horticultural logistics it is lower.
	Simplification	High	Book it yourself in a few mouseclicks'
Marketplace	Niche market	Low	No niche strategy, but rather mainstream industry; Market share is rapidly rising.
	Value Network	Moderate/high	Global freight forwarding is a 150 billion dollar industry! Optimising global trade by removing frictions is a trillion dollar value proposition.
	Cost reduction	Moderate	Cost effective to book a standard container on a standard tradelane under standard conditions; Nevertheless, container freight rates are already quite transparent.
External	Policy	Moderate	Boosting transparency, enhance efficiency thus carbon footprint. But also policies avoiding platform monopolies and geopolitical dependencies.
	Macro-economics	High	Freight Forwarding has a direct link with global trade.

From a technological point of view, the strongest disruptive power lies in its simplicity. Booking platforms may result in an insourcing strategy by shippers: "Do it yourself in a few mouse-clicks." This feature offers particular opportunities for data driven shippers that want to further automate logistics decision making.

From a marketplace perspective, platformization in freight forwarding contains some strong disruptive elements; it is not just focusing on a small niche market but targeting the mainstream global freight forwarder market, a 150 billion dollar industry!

Also the external aspects support its disruptiveness powers. The macro-economic impact of global freight forwarding is huge, particularly in relationship with removing friction in global trade and trade facilitation policies. However, there is also careful consideration of the danger of market monopolies ("winner takes all in platform economies") and geopolitical dependencies (TNO, 2015; TNO, 2019).

When applying this disruptiveness assessment framework, we can conclude that platformization in freight forwarding has strong disruptive elements on all three categories, which makes it a potentially disruptive technology for freight forwarding. We recommend to keep on monitoring the market developments.

9.2 Dutch added value

The production value of Dutch Logistics sector in 2016 corresponds to EUR 65 billion, and its contribution in added value of EUR 28 billion (CBS, 2018). The sector employs 320,000 people or 279,000 FTE. Freight forwarding services are in the CBS method part of the category 'transport-related service provision' The added value of freight forwarding services is rather low in comparison with other logistics support activities. When concentrating on the category 'transport-related service provision' (in CBS method) or chain coordination activities (in the TNO/BCI study) – this segment includes freight forwarding, shipping agents, charterers and non-vessel operating common carriers, and other intermediaries in freight transport.

Added value of chain coordination activities (including freight forwarding) is rather low, compared to other logistics support services. The direct added value of the port of Rotterdam related activities includes EUR 6.4 billion in 2012, which corresponds to 25% of the total Dutch logistics added value in the same year. It is striking that the added value per employee in the Port of Rotterdam is substantially higher than for The Netherlands as a whole, EUR 139,000 for the Rotterdam-related chain coordination activities versus EUR 67,000 for all national chain coordination activities (Kuipers & Vanelslander, 2015 and BCI/TNO, 2013).

A similar study for the Port of Antwerp (NBB, 2014), shows that shipping agents and freight forwarders in Antwerp generate an average added value of EUR 87,000 per employee.

Freight forwarding thus represents a large share of the chain coordination activities in The Netherlands, whereas a substantial share is linked to Port of Rotterdam related freight flows. The Dutch freight forwarding market is rather fragmented and characterized by a large share of SME's, also for seaport-related freight forwarding services. And the share of SMEs in international value chains is further growing (Panteia, 2014).

Given the dominance of major non-European platform players, it is expected that a shift in market share from traditional freight forwarders towards digital freight forwarders would also imply a leaking of corresponding added value from Dutch forwarding companies to internationally operating platform organizations. However, it would require more in-depth research to assess its implications for the Mainport Rotterdam economic cluster and the Dutch economy.

9.3 Labour & human factor

The previous section indicates the economic importance of freight forwarding in The Netherlands and corresponding employment figures. It is mainly administrative work, which is becoming more and more paperless. Moreover, frequent communication takes place between forwarder and customers about the visibility and status of the corresponding shipments. Resulting from different interviews both the administrative tasks as well as the communication regarding the visibility and status of the shipments

may become highly automated. Some interviewees and experts in the focus groups believe that Artificial Intelligence can replace labour within 5 years for up to 80% of the customs brokerage and visibility related communication.

Similarly, Artificial Intelligence could replace customs control and supervision labour. The UK wants to recruit 50,000 additional customs employees to facilitate the upcoming volume of processing customs declarations as a consequence of Brexit. But the coronavirus has hampered efforts to train staff to handle the extra paperwork firms will need to complete after the Brexit. Therefore, the UK is speeding up its alternative strategy to implement Artificial Intelligence to facilitate this upcoming challenge. And firms like AI Dock claim to have the AI solutions ready15. It is not a matter of whether or not AI can replace humans for this type of activity, the question is how long it will take. Also Dutch customs is exploring AI capabilities for customs control and supervision and corresponding architectures (Giordani, 2018).

9.4 Logistics competitiveness

A relevant question is whether the upcoming trend of digital forwarding has impact on the competitive position of Dutch Logistics industry. Dutch Topsector Logistics aims to strengthen the international competitive position of the Dutch Logistics Industry. A way to monitor progress is to use the nation's ranking on the Worldbank's Logistics Performance Index (LPI). The LPI is an interactive benchmarking tool created to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance.
The trade logistics performance in the international LPI is measures on 6 dimensions, being:

1. Quality of logistics infrastructure,
2. Quality and competence of the logistics service provision market,
3. Ease of arranging competitively priced international shipments
4. Timeliness of shipments and predictable shipment delivery
5. Customs efficiency of the clearance process
6. Ability to track and trace international shipments

Obviously digital forwarding and use of booking platforms have a positive impact on indicator score 3 – The ease of arranging competitively priced international shipments. It is the essence of booking platforms to offer convenience and ease in booking transport services and the interviews also indicate that platforms can offer competitively priced transport bookings. But this positive impact is probably stronger in countries with a low score on this indicator, and less strong in countries like The Netherlands. But digital forwarding and platform use may also impact other LPI categories:

- Infrastructure; The physical logistics infrastructure (roads, railroads, inland port network) is clearly not impacted, but logistics infrastructure also includes information infrastructure. Though platform use is not directly improving the ICT infrastructure, digital forwarding relies heavily on a sound ICT infrastructure (e.g. reliable mobile communication, internet and service infrastructure). Moreover, the gap between good and poor performing countries is much more apparent for the quality of the physical infrastructure then for the quality of the ICT infrastructure.
- Quality and competence of the logistics service provision market; This study did not find any indications that the rise of digital forwarders impact the quality and competence level of forwarding services as such. However, digitization in general is expected to have a positive impact on the service quality, following from less administrative errors in processing paperwork.
- Customs efficiency strongly depends on the level of digitization of accompanying transport documents, the customs declarations are already (almost) fully digital in The Netherlands and rest of

15 https://www.aidock.net/post/virus-hits-u-k-bid-to-hire-50-000-post-brexit-customs-staff-why-not-use-ai

Europe. The rise of digital forwarders is expected to accelerate further digitization of transport documents. The study however does not indicate any considerable changes for the competitive position of The Netherlands on this aspect.

- The ability to track and trace shipments was a recurring subject in several interviews and focus group sessions. Digital forwarders using platforms claim to be better positioned to offer scalable track & trace services, either by pushing the operators on their platform to comply to their own platform requirements for facilitating track & trace services, or by offering integrated solutions with other visibility platform providers. The study was not set up to confirm this claim, further research is recommended to assess the distinctiveness claims of digital forwarders in this respect.

9.5 Mainport implications and opportunities

The platformization in freight forwarding and other logistics sectors has major implications for the mainport strategy of the Port of Rotterdam. First, a substantial part of the 320,000 people employed in freight forwarding are performing forwarding operations for the freight flows moving through the Port of Rotterdam. Changes in the composition and possible decaptivation of the forwarding processes (footloose and shift towards globally operating platform giants) may have serious implications on the Port economic cluster.

Second, Port of Rotterdam has an ambition to become the smartest port in the world. With the Smart Infrastructure program, Rotterdam is currently transforming from a physical to a digital port. All pillars to accelerate the digital transformation help in realizing this ambition. This includes not only paperless processes, digital twin technology, IoT deployment, autonomous shipping and transshipment but also to support fully data driven processes. This does not only require advanced data analytics and artificial intelligence, but also to reap the benefits of platformization in maritime supply chains. This goes beyond booking platforms. Section 4.1 describes just a fraction of the Rotterdam ecosystem of different platform initiatives. More and more, we see examples of supply chain value creation through integration of different platforms, such as Blokker's demand driven supply chain solution with integrated capabilities of the platforms of Flexport, Slimstock and Yellowstar (see Section 4.3). Another example is the Portbase – Tradelens collaboration[16]. The broad range of different platform initiatives in the Rotterdam Port environment offers opportunities for integrated multi-platform solutions and services. This can help Rotterdam in accelerating the digital transformation to become the smartest port and the decarbonization of global maritime transport networks and becoming the most sustainable port. We recommend this topic to be further studies in detail to better understand this and develop effective policies to facilitate value added platform integration services.

This brings us back to the title of this study. Platformization in freight forwarding can certainly become a wolf in sheep's clothing for traditional freight forwarders that slowly digitize their processes and fail to adapt their business model by using new digital technologies such as advanced data analytics. . But at the same time platformization can be a blessing in disguise for traditional freight forwarders that embrace the digital transformation. It allows them to develop customer centric services and expand their service portfolio. Moreover, platformization may accelerate the transformation towards a smart and sustainable port. The future is being made today!

16 https://www.tradelens.com/press-releases/portbase-and-tradelens-will-enhance-trade-lanes-in-northwest-europe-through-digitization

-10-
Conclusions and recommendations

10.1 Conclusions

After a long initial period with a marginal role, Teleroute started already in 1985, the adoption and use of transport booking platforms is now quickly accelerating. In parallel, the transport & logistics sector is rapidly digitizing, this digital transformation opens opportunities for new entrants. In forwarding industry we see the same: traditional forwarders more and more digitize their processes and new digital forwarders enter the market.

A wide variety of logistics platforms appear with different roles, sourcing transport capacity, enabling the booking of transport, coordinating logistics communities and collaborative planning or providing end-to-end visibility.

This has implications for the value propositions of forwarders. Document filing becomes a commodity service and enhanced service transparency puts pressure on the value creation of searching suitable transport service providers or matching supply and demand for transport booking requests.
A key question in the interviews and expert group discussions was to what extend traditional forwarders still distinguish themselves from digital forwarders, and on what aspects. The key distinctiveness claims include:

(1) Account management and customer intimacy; Whereas traditional forwarders claim to be available 24/7 for customers questions or firefighting, the strategy of digital forwarders is to avoid the majority of questions by offering visibility and tracking and tracing solutions and anticipate on exceptions before the customer becomes aware.
(2) The ability to handle exceptions effectively and efficiently; This includes among others the booking of non-standard container dimensions, or predictable and competitive LCL bookings. Digital forwarders claim to rapidly expand their range of services, and also offering LCL solutions based on data driven approaches making use of unmatched capacities and trade lane imbalances.
(3) The know how to effectively manage hinterland complexity and customs complexity; most of the larger ports support platform initiatives to bring transparency in hinterland serviced offerings, such as Navigate for the Rotterdam hinterland. Digital forwarders aim for integration with these platforms in order to offer door-to-door solutions. Customs complexity remains a challenge and may be a competitive advantage for forwarders with customs brokerage expertise. Whereas vertical integrators such as Maersk incorporate this know-how by acquisitions, platforms believe in the power of advanced data analytics and AI engines to support declaration filing and HS code retrieval.
(4) The offering of additional supply chain services. This claim was made by both parties. Digital forwarders focus on automated insurance and payment services and standardized and scalable tracking and tracing services in conjunction with the operators using their platforms whereas some of the traditional forwarders offer broader range of logistics services such as warehousing and VAL/VAS services.

What we observe is a shift towards generating value for the shipper, a more customer centric approach, both from the viewpoint of the traditional and digital forwarder as well as vertical integrators moving into forwarding propositions. This development is further triggered by large shippers, who also become more data driven (e.g. Amazon, Alibaba, Tesla, Google, ..). These shippers explore how they can further automate decision making throughout their supply chain, which also fosters the need for digital forwarding services and integrated platform solutions.

These developments not only threatened the value proposition of some freight forwarders, but also reconsiders the strategic position and role of freight forwarders, including their power relationships with other actors. This will have an impact on the market structure. Mid-sized traditional freight forwarders observe more pressure from new digital forwarding entrants.

The discussion to which extent traditional freight forwarders are able to distinguish themselves from digital platforms hinges on a number of factors. One of them is the handling of exceptions. Although exceptions may range between minor issues with documentation and major disruptions, they usually require awareness and timely intervention. The frequency of exceptions may exceed 10% and a more extensive analysis of exceptions in the freight forwarding industry may help to better map the impact of digital platforms and identify their potential in resolving these issues. The key question remains to what extend digital forwarders manage to develop scalable solutions to cope with forwarding complexities such as customs brokerage and exception handling. This will determine the midterm and long term sustainability on the classical freight forwarding business model.

Platformization in forwarding is not expected to have considerable impact on the logistics competitiveness of The Netherlands in comparison with other countries. But it may have implications for Dutch added value, through leakage of value added activities towards large international digital forwarding players operating on a global scale.

10.2 Recommendations

Finally, the platformization in port logistics offers also opportunities for the Rotterdam Cluster. Integrated multi-platform solutions can help accelerate the digital transformation in port logistics and transform Port of Rotterdam into a smart port that is ready for two major transitions: (1) The digital transformation; and (2) The decarbonization of global maritime transport networks , through environmental footprint chain visibility.

In particular, the question whether exception handling is scalable requires more in-depth analysis. With scalability we mean that repeated handling can be done against very low or zero marginal costs, which would help create the network effect.

The traditional freight forwarder should be cautious in taking his competitive position toward digital platforms for granted. The distinguishing factors discussed in this report (Sections 3 and 8) are game and may be overcome by new technological developments such as AI. Indeed, prescriptive analytics and AI, in combination with end-to-end visibility, may support effective automation of administrative procedures in supply chains. For example, trade compliance may be automated to a large extent by advanced information services that make use of AI, once the associated liability risks can be controlled. Currently, such liabilities inhibit the use of AI in this domain and the legal aspects of platformization is a topic that needs further exploration. The development of advanced information services on logistics platforms that add value is also a topic of further research.

Platforms need to be interoperable to act as a spider in the web in the landscape of information systems that connect organizations and support information exchange between these organizations (Romochkina, 2020). A further understanding of how platforms interconnect and can create synergies is required. Other topics that need further exploration to fully understand the potential of digitalization and platformization are: The role of platforms in the further development of Synchromodal transportation and self-organizing logistics, the extent to which advanced AI-based information services on platforms meet customer requirements, and legal aspects of platformization.

Appendices

- Interview transcripts (on-line/confidential)
- Survey results in spreadsheet (on-line)

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The contents of the report reports on various opinions and insights raised by interviewees and written sources, next to the analyses performed by the authors. The authors attest that they have been able to perform their work as independent researchers and take responsibility for the contents of this report.
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SmartPort
info@smartport.nl
tel. 010 402 03 43