

Freight Forwarders' Cloud-Based Platform with Usability Features

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Abstract: Digital freight forwarders' booking platform is changing the ways in which the platform is produced, priced, formed and consumed within an international transport context. The digitization of the marketplace has forced digital freight forwarders into integrating, investing and innovating over their functional processes and engaging their associates. However, there are still some critical points that both shippers and digital freight forwarders should work towards improving despite the increasing interest in the marketplace. Therefore, this paper developed a cloud-based digital freight forwarders' platform (C-DFP) model based on stage-activity model to study usability features of the platform; 5 digital freight forwarders' platforms features are examined based on 30 realistic features to analyze existing implementation framework. The framework analysis is based on: platform feature analysis and versatility analysis. The paper indicated that the availability of data integration and services from the concerned transport suppliers will allow digital forwarders to provide and control high-end contents on the platform. The potential power and the integrated aspect of cloud-based platform will provide numerous competitive advantages over the traditional shipping process. In the future, researchers should focus on designing systems' features with shippers' involvement and validate those features using a prototype platform and illustrate the practical usage and applicability of findings and the framework of this research.

Key words: Digitalization, freight forwarders, integration, e-commerce, service platform.

1. Introduction

Information system and information technology are critical elements in the effective management of logistics and supply chain process. The key participants in supply chain business significantly reduced their assets, operating costs and improved their core functional areas due to improvements in both areas over the last few years [1]. As the World entered the Information and Communication Technology (ICT) era, the cloud-based systems became more efficient and interconnected with International freight forwarding applications; cloud-based systems have strategically improved global trade and profoundly affected the freight forwarding industry. Freight forwarders are key intermediaries in global trade as they provide a variety of logistics functions to facilitate cross border freight movement [2]. The main roles and functions played by freight forwarders include the following: arranging inland transportation, generating space on the carrier, preparing shipping documents, arranging for International transportation insurance, loading freights on carrier, customs clearance and temporarily storage and inventory management along the transport process. The related operational functions in the overall transport process must also be efficiently and effectively executed if benefits along the logistics and supply chain are to be realized [3].

The utilization of information technology that has evolved over the year is not a new thing in International trade and transportation chain. Basic information technologies including those used for booking, EDI, bar coding, and track and trace have been used to increase information exchange, optimize productivity and construct a more effective and efficient logistics and international transport process.

In freight forwarding area, information system and information technology are gaining a lot of market traction and changing the way freight forwarders' functional processes cope with demand for transactions in international transport. Changes in World trade and transportation areas require digitalization in freight forwarding systems to accelerate further development.

First, the market size and volume of global freight forwarding have been growing immensely. In 2016, the global freight forwarding market revenue reached 141.9 billion U.S. dollars, reflecting an increase of 2.7% year-on-year with 2.6% cargo volume growth estimated. By the end of 2020, freight forwarding market is expected to reach 166.7 billion U.S. in revenues globally [4]. In that respect, investment in process integration in supply chain systems is of prime importance and should be given highest priority to allow investors in logistics services to enhance their competitive position [5].

Second, shippers tend to meet more on demand based pricing with shorter contracts and spot rate requests to optimize their freight expenditure in more dynamic ways and the execution of shipment along the transport process [6]. In this pricing method, shippers' responsiveness to purchase freight forwarders' transport product at different prices is compared and then an acceptable price is selected.

Third, rapid growth of cross-border e-commerce is already a game changer in logistics given that it is stimulating change and innovations in freight forwarding. Consumers can purchase from sellers located in overseas countries by using on-line freight services developed by freight forwarding or express marketplaces or freight forwarders as part of their e-commerce process. Door to door freight service is required once the goods purchased by the consumer on-line have arrived. This calls for service levels, accessibility and feasibility options along the transportation process in the future. In this regard, advanced last mile delivery, storage, tracking and EDI technology needs to be applied throughout the entire process.

Digital freight forwarders' platform must allow customers to book, manage, make payments and monitor freights online at the click of a button. The current generation of digital devices enables end-users to utilize datacenter-based cloud computing service that is bundled with digital devices [7]. Though digital freight forwarders are key facilitators of international transport in this era of e-commerce, a lack of scientific research can be observed in that digital freight forwarders' platform usability have not been studied, investigated or analyzed.

This research aims to develop the nature and characteristics of digital freight forwarders' platform models and propose a primary concept for sustainable implementation of digital freight forwarders' platforms. Consequently, this study addresses following research questions:

- RQ1. How can a digital freight forwarders' platform be defined?
- RQ2. What are the major requirements for sustainable implementation of the digital freight forwarders' platform?
- RQ3. What implications can be derived from this research?

This research is organized into five sections: Section 2 provides a review of theoretical foundation; Section 3 develops the cloud-based digital freight forwarders' platform (C-DFP) model based on stage-activity model, facilitates the development of a framework of platform for exporting shipment; Section 4 presents the methodology through mapping existing exporting shipment process in the C-DFP model into shipment booking features, identify 30 realistic features based on practical transport operations process in order to exporting shipment features for the platform and existing 5 most popular digital freight forwarders' platforms examined; Section 5 presents discussion and findings detailing the implications for

practice and summarizes the results in addition to presenting the limitations of the study.

2. Background and Related Works

2.1. Chain Integration across International Transport Industry

Integration in communication, functions, relationships, processes and resources between key players in the international transport chain continues to create value and increase productivity. Ref. [8] developed three phases of logistics network resource integration: the element integration of logistics network, integration of functions and information, and vertical logistics network resources integration. Another interesting study by ref [9]. the development of integrated systems found that organizing transport flows through integration of key participants led to efficiency that resulted in the reduction of transportation costs. Ref. [10] analyzed efficiency performance by integrating supply chain and concluded that isolated customer integration can't achieve efficiency; and when customer integration is low, higher efficiencies cannot be achieved.

The existing digital freight forwarders' platform meets integration needs in both vertical and horizontal functions. Fig. 1 shows the scope of integration for supply chain collaboration of participants through the platform: vertical integration, including integration of carriers: airlines, shipping lines, multimodal transporters and other service providers with shippers. Horizontal integration: integration across competitors of digital freight forwarders, other organization to work with agent networks.

The horizontal integration design is not only intended at realizing the relationship of logistics network participants at the same level, but also to enlarge the scope of cooperation among logistics network participants and enhance network connectivity [8]. On the other hand, vertical integration is targeted at enhancing productivity and services for customers [11] through integration with carrier's competence and additional services in the production of the final product [12].

According to ref. [13], the integration of shipper-carrier relationship was enhanced due to the potential benefits of closer collaboration including; raising productivity and significant reduction in transportation costs. Ref. [14] reported that platform development lead to more integration of different products. In effect, freight forwarders' horizontal integration of the choice of transport order fulfillment brings better solutions when: it is generated in an extended decision space, significant cost savings are required and demand is greater than its' own capacity [15]. Thus, combining resources and services of freight forwarders in other countries over horizontal integration enables the provision of not only more expansive service with a global reach than individual freight forwarders would be capable of offering on their own [12] but also perform value added services [16].

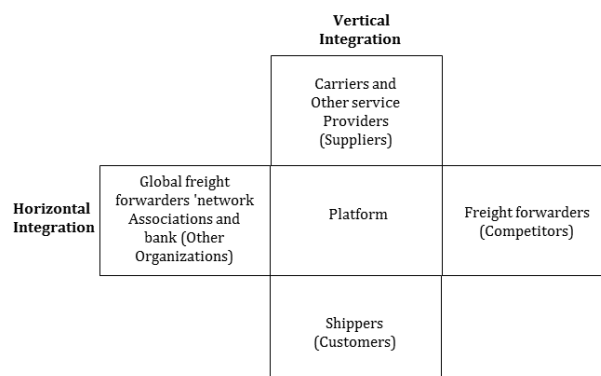


Fig. 1. The scope of integration (This shows the platform scope consisting of horizontal and vertical integration of functions to enable players to collaborate efficiently through the platform).

2.2. It Re-shaping International Transport

IT as a strategy has been rapidly developed in the supply chain field, where most of developments has evolved to make shipping simple and predictable.

Prior to the internet, key players such as carriers, customs brokers, Freight forwarders, and shippers communicated across a private network. Due to the expansion of e-commerce, there should be a transformation of logistics scheme based on purchasing trends of customer [17]. A public data network supported significant reduction in the cost of internet, reduced time for communication and process between the various players in international trade and transportation chain. Early Information and Communication Technology (ICT) systems were limited to booking, tracking cargo shipment and eliminating the need for a part of paperwork. Over the past decades, e-commerce has achieved the age of maturity. E-commerce has made it possible for businesses to directly approach customers located anywhere in the World anytime [18]. However, Ref. [3] argued that a large amount of human input is still required and information exchange amongst participants in the international transport chain is minimal even if new technology was able to reduce some paperwork.

Utilizing both homegrown and third-party platforms, digital freight forwarders continue to expand their use and development of online quoting and booking tools. Such platforms help freight forwarders manage their prices, contracts, and pricing [19]. Now, Cloud computing technology has become increasingly popular due to its advanced features [20]. The huge potential of cloud computing has attracted a lot of interest among players in the international transportation. The digital freight forwarders have fostered cloud-based technology platform to provide: easy-to use operation system; cost effective solution; data storage for shipment; real time shipment order entry and tracking from shippers' end, using available resources in the platform within the chain and/or combined with a share of computing resources available throughout the platform [7]. It has enabled instant shipper comparison of price, booking, obtaining shipping documents, paying and tracking their export shipments as easy as that of booking airline ticket on Skyscanner. Freight forwarders in return get automatic booking and up-front payments without any off-line sales activities. The platform takes care of pricing, booking, invoicing, forwarding related information and communication.

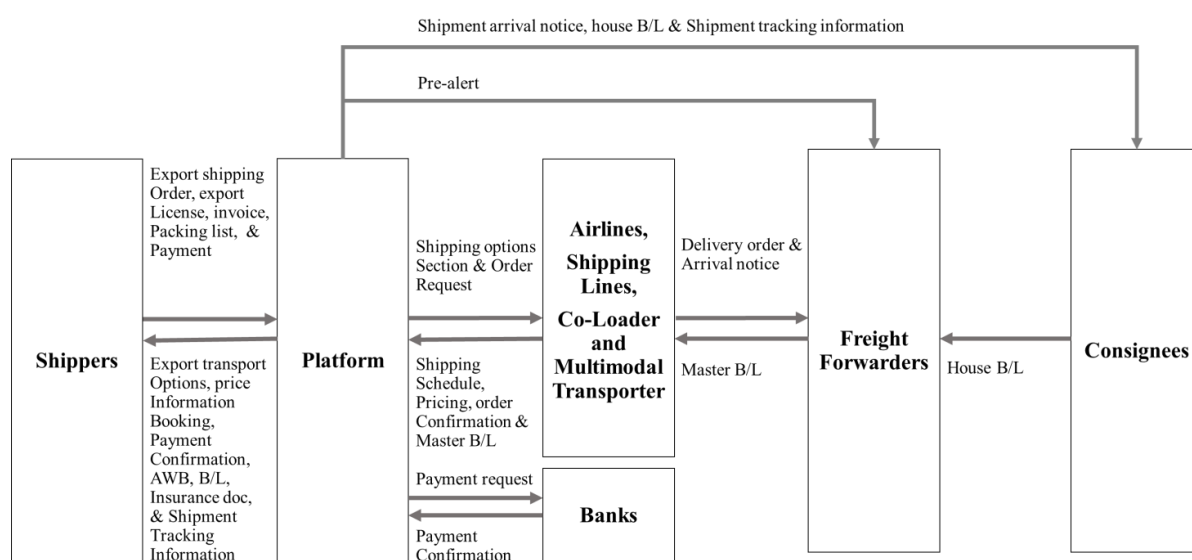


Fig. 2. Information flow and data exchange through the platform.

The marketplace operates through a largely similar system: the user inputs the origin and destination of desired cargo, along with the date, cargo size and other pertinent information into an online interface, and

the information is analyzed and matched with a series of priced options provided in a list. Sometimes the prices are extracted from a database of prices and movements provided by carriers and forwarders in advance [21]. The proposed information flow and data exchange through the platform is shown in Fig. 2 and depicts the current information flow between major participants, including shippers, carriers, and freight forwarders and consignees in the international transport chain. Information is updated and delivered along with each stage carried out one after the other throughout the platform. However, the process still requires some common manual tasks to be performed including: shipment arrival and delivery notice from shipping lines to freight forwarders; freight forwarders present original B/L to shipping lines at destination port if shipper was not willing to surrender it.

3. A Cloud-Based Platform for Export Shipment Management

Ref. [22] highlighted the importance of understanding end-to-end process of user experience in software and digital service design as it has a lot potential to influence on service design and production process which include an assortment of roles, varying operations and interests of users.

This research emphasizes on: accentuating customer workflow as planning puts attention on customers' basic requirements for processing; usability features of the platform through which transactions are conducted. In the first phase, the workflows in which the various tasks that need to be developed based on existing exporting shipment process from the shipper's perspective to building the platform model. The stage-activity process is applied in line with suggested steps from 25 international legacy freight forwarders. There are 10 transaction steps required and involved in order to manage export shipment order management, collected from twenty international freight forwarders as follow:

(1) Step 1 (Specify request): Shipper accesses the platform and searches for shipment booking options.

(2) Step 2 (Searching information on booking options). Shipper selects preferred shipping options in the list based on exact dates or flexible dates for shipping out.

(3) Step 3 (Account logging in): The shipper logs into the customer account page that is available. The customer account page helps the shipper in organizing shipment, order booking, facilitates easy communication with platform agent, data storage, and downloading of related information exclusively with virtual servers [23]. There are also other several features that the shipper can use to make international transport more efficient.

(4) Step 4 (Retrieving booking options): Digital freight forwarders that have matching transport options to the shipper's requirements send back the information to the shipper either via online interface with carriers or the platform database. The shipper then completes the booking process after selecting the transportation option, schedule and price suitable to them. After completion, an order confirmation page will appear confirming the order.

(5) Step 5 (Making payment): All charges and final billing amount are displayed on the route descriptions. The shipper then proceeds to make the payment using the preferred payment method including; credit card payment or payment through bank transfer. In using the credit card payment, the shipper enters credit card holder's details and goes through the verification process to complete payment when the customer accepts selected transport option and charges. For payments through bank transfer: once a customer selects bank transfer as the preferred option for payment, the shipper performs the transfer through bank to complete the transaction.

(6) Step 6 (Verifying payment): International bank transfer takes up to a few days to be verified. The credit card verification processing is verified within a few minutes.

(7) Step 7 (Purchasing confirmation): Once shipper's payment is verified, the platform generates the

booking confirmation number and e-invoice, which the shipper can view/print from the login page. The order confirmation page displays all of firm booking details, tracking number, including the booking confirmation number. The shipper also receives the booking confirmation e-mail with all order information.

(8) Step 8 (Complete purchasing): When the purchase is completed, the shipper can check estimated shipping schedule and related shipping process; the agent of digital freight forwarders gets in touch with customer to step through the shipping process.

(9) Step 9 (Shipping Documentation creation): the agent collects shipping documents from the shipper and enters the info into an internal system to arrange pick up, customs declaration, and loading onto the aircraft or vessels. According to transport mode, Ocean Bill of lading (B/L) or Airway bill (AWB) created based on shippers' shipping data: invoice and packing list.

(10) Step 10 (Tracking and tracing): Track current location of real cargo using e-mail and using updates from the platform which provides reminders of the status of the shipments. Each shipment is verified and tracked by interface with track and trace system of carriers or real live agent of digital freight forwarders.

Ref. [7] indicated that the entire workflow reflects a linear model if the activities of each step are carried out smoothly. However, workflow usually proceeds following a sequence of iteration of the activities in practice.

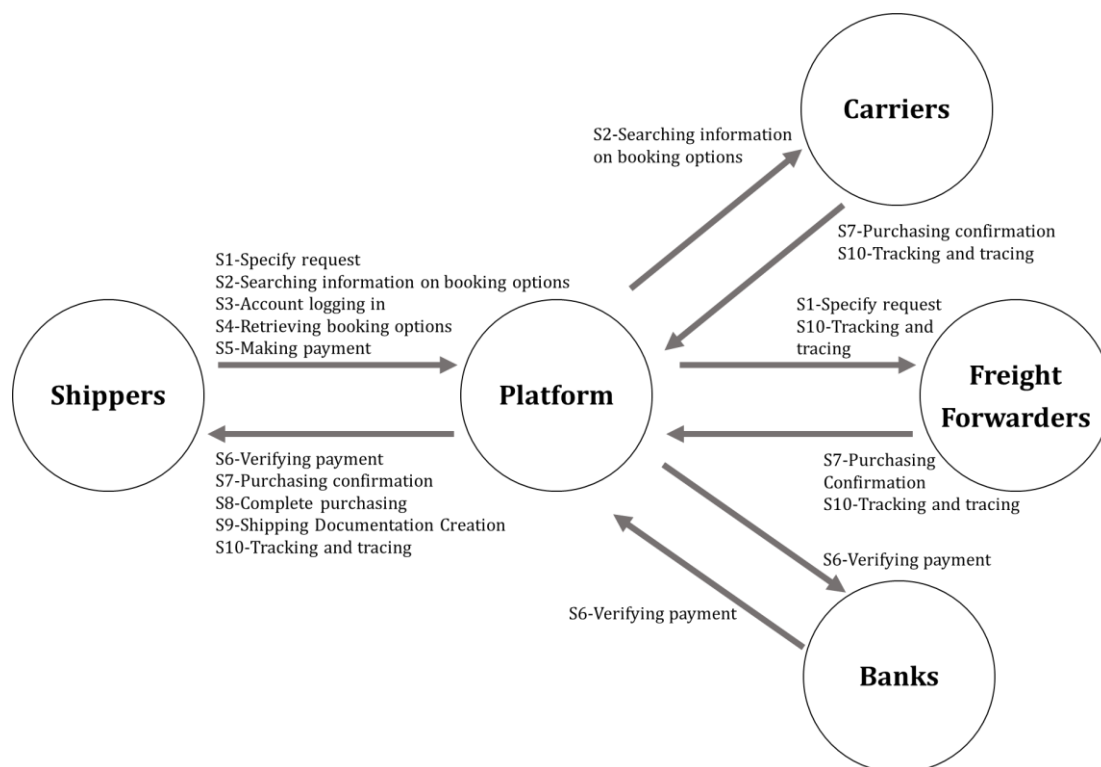


Fig. 3. A cloud-based freight forwarders' platform (C-DFP) model.

Fig. 3 illustrate the key participants involved in the platform ranging from the initial step of export shipment order and management to the final step of activity in platform: In S1, the shipper accesses the platform and searches shipment booking options; in S2, the shipper follows the sequence to select the preferred shipping option based on preferred dates for shipping out; in stage S3, the shipper is required to log on to enter customer dashboard. Customer dashboard provides various options and features: Shipper's account setting and profile; e-mail box; shipment tracking and trace; uploading and downloading of shipping document; prices; carrier route and transit time; order modification; bid management process and other additional information. The shipper will find out booking request, all related details about booking

order, available discount and a promotion code in S4; S5 shows a variety of payment methods accepted by the platform. Shipper can pay by bank invoice or by web services or credit cards after finding booking details in the customer dashboard; In the S6, verification of payment made is done: bank transfer payments take a few days while payments made via directly from credit card take a few minutes to be verified. The order confirmation number, receipt/invoice, and customer order notification will be sent in S7; Shipper can contact an agent via e-mail or instant chatting room in S8; S9 provides documentation for shipping and export shipment information during the carriage of life expired repeatedly for quotes, order bookings, issuing Bill of lading/Airway bill (AWB/BL) and filings.

Those essential cloud-based services are made available by data storage on distance digital devices technically referred to as 'cloud' instead of local data storage [24]; In S10, Information about the positions of shipment display in real time from the moment of pickup and delivery to consignee at final destination is made available.

4. Methodology

4.1. Features of Freight Forwarders' Cloud-Based Platform

First, the platform model, C-DFP in Fig. 3 has been developed based on existing exporting shipment process in line with the stage activity process model. 10 transaction steps defined in C-DFP are categorized and then further grouped based on associated features following the activities conducted in the export shipment order management process.

Second, the 10 transaction steps are expanded with the associated features, existing exporting shipment process from shipper's perspective, a total 30 realistic features shown in Table 1. Third, 5 digital freight forwarders' platform features are examined based on 30 features mapped to C-DFP model.

Finally, the summarized results determine what features are required to enhance usability, enabling better business flexibility for both freight forwarders and shippers as end-users of the platform. This study adopted and modified Wei and Ozok's framework [25] for developing web-based mobile airlines ticketing model and workflow management model for web publishing by ref. [26].

4.2. Data Collection

In collecting raw data for this research to illustrate the 30 features in each step identified to perform various tasks in the platform 25 international legacy freight forwarders' existing export process was involved.

Additionally, 5 major platforms of major digital freight forwarders, F Company (P1), F-1 Company (P2), S Company (P3), S-1 Company (P4) and T Company (P5) are selected to analyze as a study group and their platforms were examined based on these 30 features mapped to C-DFP model. Concerned results are condensed in Table 2 and 3, the platforms are listed alphabetically; however, 30 features are listed in the order of how C-DFP model may be processed.

4.3. Validation of C-DFP Model-Based Usability Features

The process and feature validation provide the required technical perspectives as well as real-world implementation requirements for the proposed transaction construct. C-DFP model-based features can be validated by making a comparison between the identified 30 features and the existing implementation patterns of 5 digital freight forwarders' platforms. 30 features in Table 2 covered more than existing hands-on work features from 5 digital freight forwarders platforms by incorporating real-world implementation requirements (e.g., S2.1 and S3.3 have identified as required features, however, those are not provided by the 5 digital freight forwarders' platforms).

Table 1. The Stage-Activity Process Model for the Platform Process

Stage	Features	Activities
Step 1: Specify request	S1.1	Platform access and search begins
	S1.2	Select specific transport mode
	S1.3	Select origin and destination
	S1.4	Shipping date on calendar available
	S1.5	Commodity category selection
	S1.6	Definite amount, number, size and weight of shipment
	S1.7	Packaging option
	S1.8	Temperature control option
	S1.9	Consignment pick up time can be chosen
	S1.10	Point of contact and address for pick up
	S1.11	Insurance arrangement available
	S1.12	Additional service arrangement in destination available for International shipments
Step 2: Searching information on booking options	S2.1	Real time multiple carriers option display by rate search engine
	S2.2	Available to search local service rates for worldwide destinations
Step 3: Account logging in	S3.1	Login required for further booking
	S3.2	User account to manage booking and shipments within personal dashboard
	S3.3	Request a quote based on regular freight volume
	S3.4	Bid on international and domestic shipments
	S3.5	Real-time communication with agent
	S3.6	Load calculation by transport mode
Step 4: Retrieving booking Options	S4.1	Promotion code into the system for other payment terms and discounts
	S4.2	Estimated shipping route and lead time available
Step 5: Making payment	S5.1	Payment methods using credit card, bank or e-cash is available
Step 6: Verifying payment	S6.1	The order passes automatically after verification of payment for select booking
Step 7: Purchasing confirmation	S7.1	Create the order confirmation number
	S7.2	Send receipt/invoice, and customer order notification
Step 8: Complete purchasing	S8.1	Agents contact for further process of shipping
Step 9: Shipping Documentation Creation	S9.1	Shipping data enter into freight forwarders' system to shipment movement
	S9.2	Creation an ocean Bill of lading/Airway bill (AWB/BL)
Step 10: Tracking and tracing	S10.1	Available to keep track of cargo location and status at all times (Air, Sea and Road)

5. Findings

Table 2 displays the matching basic attributions among 5 digital freight forwarders' platforms.

Table 2. The C-DFP Features for Digital Freight Forwarders' Platform

Features	P1 (F Company)	P2 (F-1 Company)	P3 (S Company)	P4 (S-1 Company)	P5 (T Company)
S1.1	N	Y	Y	Y	Y
S1.2	N	Y	Y	N	Y
S1.3	Y	Y	Y	Y	Y
S1.4	Y	Y	Y	Y	Y
S1.5	Y	Y	Y	Y	Y
S1.6	Y	Y	Y	Y	N
S1.7	Y	Y	Y	Y	N
S1.8	Y	Y	Y	Y	N
S1.9	N	Y	Y	N	N
S1.10	Y	Y	Y	Y	N
S1.11	Y	Y	Y	Y	Y
S1.12	N	N	Y	N	N
S2.1	N	N	N	N	N
S2.2	N	N	Y	N	N
S3.1	Y	Y	Y	Y	Y
S3.2	Y	Y	Y	Y	Y
S3.3	N	N	N	N	N
S3.4	Y	N	N	N	N
S3.5	Y	Y	Y	Y	Y
S3.6	N	Y	Y	N	N
S4.1	N	N	Y	N	N
S4.2	N	Y	Y	Y	Y
S5.1	Y	Y	Y	Y	Y
S6.1	Y	Y	Y	Y	Y
S7.1	Y	Y	Y	Y	Y
S7.2	Y	Y	Y	Y	Y
S8.1	Y	Y	Y	Y	Y
S9.1	N	Y	Y	N	N
S9.2	N	N	N	N	N
S10.1	N	N	N	N	N

However, there are several features that are offered based on identify of each platform structure. This study conducted a further analysis in which aggregated findings from the features of the 5 digital freight forwarders' platforms are analyzed. To take a concrete form, first, each feature is analyzed to find out which feature is used most widely to features that are used less often to those that are non-existent against the identified 30 features in each step. Second, each feature from 5 digital freight forwarders' platforms is analyzed to understand the versatility of those platforms.

5.1. Features of 5 Digital Freight Forwarders' Platforms

The distribution of the 30 features are mapped with 5 digital freight forwarders' platform features provided in Table 2 to pull out features that are most widely used from those that are not. The related distribution is displayed in Table 3. According to the analysis, the most widely used features are S1.3, S1.4, S1.5, S1.11, S3.1, S3.2, S3.5, S5.1, S6.1, S7.1, S7.2 and S8.1. 12 features have 100 percent distribution and indicate features that are usually used at the step of specifying export options and finalizing purchase.

This indication clearly validates the most essential features to perform initial tasks as used in platforms. The least commonly used features are S1.12, S2.2, S3.4 and S4.1, 4 features with 10 percent distribution. The four features imply that these features are needed and therefore acknowledged by some digital freight forwarders, but it has not been universalized despite being crucial. For example, feature S1.12 and S2.2 gives insight and very useful support to shipper for shipping terms (e.g., delivery duty paid). S3.4 and S4.1 enables shippers to negotiate price with digital freight forwarders when they have cargo volumes or direct contract with shipping lines. Further analysis shows that S2.1, S3.3, S9.2 and S10.1 features are non-existent features indicating that no digital freight forwarders among the 5 considered using them. Despite providing

benefits for both shippers and digital freight forwarders these four features are not utilized.

Table 3. Analysis of 5 Digital Freight Forwarders' Platform Features

Features	Total number of features	Percentage (%)
S2.1	0	0.0
S3.3	0	0.0
S9.2	0	0.0
S10.1	0	0.0
S1.12	1	20.0
S2.2	1	20.0
S3.4	1	20.0
S4.1	1	20.0
S1.9	2	40.0
S.3.6	2	40.0
S9.1	2	40.0
S1.2	3	60.0
S4.2	3	60.0
S1.1	4	80.0
S1.6	4	80.0
S1.7	4	80.0
S1.8	4	80.0
S1.10	4	80.0
S1.3	5	100.0
S1.4	5	100.0
S1.5	5	100.0
S1.11	5	100.0
S3.1	5	100.0
S3.2	5	100.0
S3.5	5	100.0
S5.1	5	100.0
S6.1	5	100.0
S7.1	5	100.0
S7.2	5	100.0
S8.1	5	100.0

Specifically, S2.1 is crucial for shippers in seeking and finding real-time shipping options with prices. Some platforms seem to offer carriers' real-time shipping options with prices. However, this research found none of the studied platforms are directly interfaced with either airlines or shipping lines. This finding indicates that shippers can't take advantage of real-time benefits as expected. If feature S3.3 is used, the shipper is required to place a one-time order for regular export shipment. Due to absence of this feature, the shipper must place an order for regular shipment and pay for each shipment order. Absence of feature S9.2 does not allow shippers to get shipping documents in the platform, but manually via e-mail or fax. S10.1 is a feature for real-time tracking shipment from the moment the cargo is picked-up from the shipper to the time it is delivered to its destination. The examination found that some platform provides shipping lines' tracking system links and therefor air, multimodal and door to door shipment is not feasible even if real-time tracking allows visibility of goods and the reception of advance information about cargo and security status [27].

There are more findings on the basis of Table 3 as follows:

- The credit card payment method makes it very easy for shoppers to settle accounts, which is essential for increasing conversions in the process and customer convenience. All 5 digital freight forwarders provide various online payment solutions.
- After logging into the platform, all the 5 digital freight forwarders offer real-time communication with their shipping agents. This offline feature supports shippers' further arrangement of export shipment order.

- 2 digital freight forwarders only give a feature; S3.6 allows the calculation of loading goods into an aircraft, container or a vehicle in the most optimal way. In case of absence of this feature, shippers need to contact a shipping agent in order to find an optimal way to load and also price changes based on load ability of goods.
- Only 1 digital freight forwarder offers an open bid service feature, S3.4, providing a settled portion of the volume of goods to a digital freight forwarder who bids the lowest price for specified routes. When shippers accept the bid, payment for the shipment via an approved payment method is available for further arrangement.
- To facilitate a timely pick up of the consignment (Goods/Containers) for shippers, a submit pick up request is first processed. 2 digital freight forwarders' feature S 1.9 allows placing request, pick up time as well as required information for pick up (e.g., Pick up location, shipment detail and contact information) through an online form.
- 3 digital freight forwarders' estimate shipping route and related lead time in overall transport; feature S4.2 supports shippers to have insight into their supply chain management.
- All the 5 digital freight forwarders' platform offers cloud dashboard to customers, providing several important benefits including: the ability to integrate multiple shipping data sources into a customer dashboard to generate unique supply chain insights and easy processing of related shipping tasks through the dashboard.

5.2. Platform Versatility

The platform versatility of the 5 digital freight forwarders is studied in this research. The total number of features each digital freight forwarder utilizes is presented in alphabetical order in Table 4. From among the 30 features listed in this study, the examination of the 5 platforms found that a minimum of 15 and up to a maximum of 25 features are utilized by these platforms. There is more finding based on Table 4 as follows:

- All the 5 platforms have implemented more than 50 percent from 30 features. At 25 features, S Company (P3) platform has the highest implementation ratio of features examined in this study representing 83.3 percent implementation rate.
- The implementation percentages out of 30 features in 5 platforms are between 50 and 83.3%. S Company (P3) has highest (83.3 percent) implementation ratio and second highest number of features (22 features) possessed by F-1 Company (P2) in its platform. T Company (P5) has the lowest number of features (15 features).
- Three platforms (P1, P4, and P5) implemented less than average number of features (19.4) and 2 platforms (P2 and P3) implemented more than average number of features.

Table 4. Analysis of 5 Digital Freight Forwarders' Platform Versatility

Digital freight forwarder	Total number of features for each company	Percentage of features for each company
P1	17	56.6
P2	22	73.3
P3	25	83.3
P4	18	60.0
P5	15	50.0
Average	19.4	64.64

6. Conclusions and Implications

Online transport arrangements have strategically empowered shippers to bypass more traditional model of transport management mechanism. The potential integration of key players or participants in the

international transport chain and engagement of ICT infrastructure is key to sustainable growth in this business area. Due to the continuous advancement of cloud technology and related services in the market today, digital freight forwarders appeared to conduct e-business through their own platform. The availability of data integration and services from the involved transport suppliers (e.g., carriers) will allow digital forwarders to provide and control high-end contents on the platform. The potential power and the integrated aspect of cloud-based platform makes it handier of the traditional shipping process. What does all this mean? Are those platforms going to replace legacy operating structure in the International transport area? At first glance, there are specific features that digital freight forwarders have to offer to stay ahead of competition from legacy freight forwarders.

In this research, developing the cloud-based freight forwarders' platform with usability features presented will provide the much-needed competitive advantage. Major purposes of platform usability analysis are: cost reduction; increasing efficiency and productivity of product evolution; and lead time reduction [14]. Ref. [18] also highlighted that transportation should be seen from a systematic perspective, allowing end-to end solutions and address all different transportation needs regardless of cities, regions, and countries. In this regard, examination of the specifications and information transaction flows in platforms of the study group from C-DFP model conducted in this study allows digital freight forwarders to determine what features are required to develop and focus to secure and maintain their competitiveness in the market. The major findings in this research indicate that; digital freight forwarders' platform features must reflect existing legacy freight forwarders' operations scope to conduct tasks through the platform from shippers' perspective; developing real-time processing is critical to lift positioning for prosperity and the key to future productivity gains for all participants in the platform network.

The findings of this research have significant implications in the international transport field. First, the number of features used in the platform is crucial to enhancing platform performance. On the basis of this research, only 64.64 percent features are used in study group platforms out of 30 features, which identified by 25 legacy freight forwarders as required features to conduct tasks through the platform. This result indicated that smoother functioning of order management through the platform is not realistic and only the development of required features will provide a user-friendly platform and convenience. Second, real-time internet access is most significant from the shipper's perspective [25] and real-time processing is particularly important to determine success and sustainable implementation of the digital freight forwarders' platform due to:

- Additional costs may occur in the practical / actual process of international transport (e.g., container or cargo storage, cargo inspection, labeling and packing) but there is, however, also various value-add service rates are not considered in the platforms;
- The interface between platform and carriers (e.g., airlines/shipping lines) to real-time filing prices and update the availability of spaces speed up overall operations process;
- Only limited gains can be made in overall supply chain integration without information integration [28]. However, the ability to share information on a timely basis enables the improvement of overall supply chain performance. The system must incorporate flow visualization for users to conveniently validate and analyze the movement of shipments [29] with interface with carriers' track and trace system.

Third, sharing exact volume and specific types of shipment anticipated and establishing time volume contracts (TVCs) allows shippers in price negotiation with carriers. Due to absence of this streamlining transport pricing mechanism in platforms, there is the need to develop it to provide the following benefits to shippers; prevent shipper's risk by negotiating period of TVC less than one year [30]; fixed long-term freight price negotiation based on shippers' regular freight volume facilitates better pricing, efficient processing operations and billing communication between the shipper and the digital freight forwarders.

Fourth, to effectively deal with worldwide destinations, the availability and resources of freight forwarders' network, the different types of carriers and their real-time price updates for service is important –resources and player real time availability is key to successful implementation of global freight networks. Most platforms as service providers understand the importance of partners and therefore devote significant resources to supporting customers in network right from the beginning [31]. In addition, a personalized and customized service is required to provide emergency services in case of a special requirement [32]; and export shipment management for vertical market and heavy-lift and project cargo service over global networks through worldwide resources.

Therefore, the ideal C-DFP model design must be able to not only attract customers with low price concept but also become a real-time based system. However, the most important consideration of cloud-based platform is the use of the critical features that allow important tasks to be conducted on the platform and linking or integrating the required features effectively. A major limitation of this research is that required features only identified legacy freight forwarders without the involvement of direct shippers into the stage activity process. Therefore, future research should focus on designing systems' features with shippers' involvement and validate those features using a prototype platform and illustrate the practical usage and applicability of findings and the framework of this research.

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