

The Concept of “Dizistics”- Stay Ahead of Freight Forwarders’ Business Model

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Abstract: As a developing technology of decentralized-computer-terminal participants, referred to as block chain or distributed ledger technology (DLT) enables exchange: real-time data and information; requirements; direct contracting between seller and buyers without employing intermediaries. Purpose of this research is to develop attributes of dizistics utilized block chain technology and propose a primary concept for sustainable implementation of dizistics for new operations process, changing interaction with stakeholders and building confidence and trust by eliminating freight forwarders and intermediaries in international transport industry.

Methodology: This is a theory development research which relies on theoretical framework and literature review.

Findings and Conclusions: The result of this research at the initial preliminary stage of investigation in how dizistics concept could be defined and facilitate the development of new freight forwarding business model. This research provides new understanding and overview of dizistics concept and impacts several dimensions of freight forwarding model; through decentralized financial transaction and database; peer to peer network and trustworthiness of digital records.

Key words: Block chain, decentralization, dizistics, freight forwarders, peer to peer network.

1. Introduction

Traditional practice of logistics requires freight forwarders in a central actor with its indispensable functional roles within international transport area; issuing transport documents (e.g., airway bill (AWB), bill of lading (B/L)), settlement between shippers and service providers, providing shipment movement information and value-added service. To effectively perform the role of a middleman, information system and information technology is of prime importance from a freight forwarder’s perspective. Freight forwarders and logistics service providers have significantly reduced their asset base, operating costs and improved their core functional areas due to improvements in these areas over the last decades [1].

There is a continuous discussion in the field of freight forwarding, especially on the issue of digitization, as to what technologies and models can optimize resource use and support sustainable development in line with digitization. This discussion forms the main subject of this research.

In international freight transport, the Internet of Things (IoT) technology has improved freight monitoring and is used in controlling freight location movement, detecting data discrepancies to prevent any waste in transit. Even with a well setup IT infrastructure and data governance structures, several concerns and risks still exist: continuous reliability and alleviating cyber threats require continuous

monitoring, effective standards and internal controls [2]. The use of cloud-based logistics platform provides users with several advantages including: various price options, scheduling and routing; booking the shipment and monitoring as well as facilitated payment. However, the lack of progress still exists due to: continued multi-step, multi stakeholders, as well as multi-payment steps along the process of transport [3]. Also, the existing systems also make users very dependent on mobile network operators whose network capacity may have bottlenecks associated with coverage, bandwidth and latency issues [4].

To optimize the existing freight forwarding business flows and overcome the multiple challenges in today's competitive logistics environment this research presents Dizistics concept. Dizistics (Digitization + Logistics) can be defined as digitized logistics management in planning, implementation and control of transport and valued added activities while ensuring efficiency along the supply chain by using advanced digital technology. As Fig. 1 shows, Dizistics allows real-time exchange of data, documentation and information; requirements and fulfillment; direct contracting and settlement between key service providers and buyers without employing any intermediaries (e.g., legacy freight forwarders and logistics service providers) with digitization solutions.

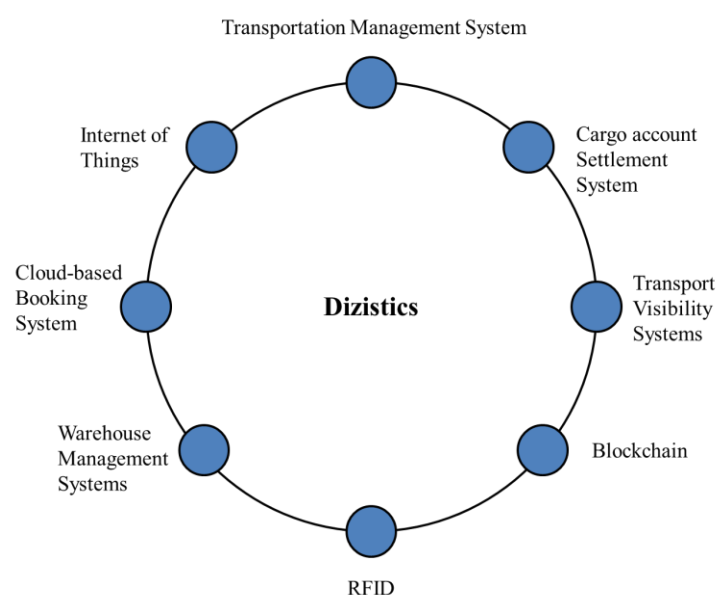


Fig. 1. The major component of technologies in dizistics.

1.1. New Freight Forwarding and Logistics Option

Ref. [5] noted that block chain will not only transform the way businesses are organized and manage but also create products and services and deliver value to stakeholders in a supply chain network. Ref. [6] also indicated that block chain technology is an appropriate tool for negotiation of logistics contacts because it will allow every user to access the pricing policy of every service provider as the ledger is decentralized and transparent. According to ref. [7], a block chain is decentralized, distributed ledger which confirms and stores transactional files added to the chain. Despite these opportunities, block chain only exists as a concept, or as a number of prototypes and limited architectures. This research is motivated by these capabilities and features of blockchain and the value they can add to logistics and freight forwarding. Therefore, this research aims to develop attributes of dizistics utilizing block chain technology and proposes a primary concept for sustainable implementation of dizistics for new operational processes, changing interaction with stakeholders and building confidence and trust by eliminating freight forwarders and intermediaries in international transport chain. Consequently, this study addresses the following

research questions: (RQ1) Is it possible to design Airbnb service as a solid alternative to replace legacy freight forwarding service? (RQ2) How will block chain change the freight forwarding process?" In this research, author examines the concept of dizistics in greater detail.

2. Dizistics as a Potential Game Changer to Freight Forwarders' Business Model

A Block chain is a new instrument of digital business flows which could create a new generation of logistics and supply chain information technologies as well as systems in the future [8]. Applying block chain with compatible technologies will not only disrupt legacy freight forwarders' traditional business model and provide a solid alternative in transport chain but will also offer solutions to structural problems facing the international transport industry:

- 1) Peer-to-peer contract between service users and transport service providers - Block chain allows the elimination of intermediaries and thereby providing tools for secure contracts between transport service providers and service users [9]. Block chain will facilitate a peer to peer interaction between two (or more) parties that do not know each other [10]. In freight forwarding, service users (e.g., importers/exporters) can share information about themselves using a computer-generated code which is a key procedure that supports service providers (e.g., carriers, customs brokers, banks and freight forwarders etc.) in gaining confidence and trust and execute contract automatically once certain contract conditions are fulfilled [11].
- 2) Digitize real-time exchange of process, events and documents - All transport documents (e.g., arrival notice, AWB, B/L), visibility (e.g., actual arrival time, delay and current location of shipment) is shared in a more harmonized fashion between all involved parties. Maintain a backup of shipping documents; license and customs declarations form, invoice and packing list can be readily and securely shared between concerned parties. Block chain organic logics ensure not only ensure the generation of contracts, agreements and shipping order forms but also maintains document reliability, accessibility and incorruptibility [12].
- 3) B2C sales and marketing - As we have noted, block chain allows service users to engage with transport service providers on a peer-to-peer basis. In this regard, transport service providers not only seize their target audience with great precision with various promotional rewards but do not have to worry about service users and their payment [5]
- 4) Improving transport service price transparency - The key features of applying block chain technology in transport is improving price transparency not only in terms of freight cost but also all other relevant charges (e.g., customs declaration, fuel surcharge, labeling, packaging, transport document, terminal handling charges). Ref. [13] emphasizes that price transparency is a concern shared by all air transport end users from the perspective of cargo services. Transport service users usually establish time volume contracts [14] for ocean shipping price or extract them either from websites or agents of freight forwarders. The price structure for traditional freight forwarders' is quite different [13], however, block chain eliminates the need for centralized pricing control by eliminating the need for trust management role of middleman [12].
- 5) Theft and cyber-attack detection – Ref. [15] described cyber security issues related to cargo transport information that may pass through a maximum of 50 different systems owned and controlled by different parties including ports, customs brokers, transporters, banks and information portals who do not share a common IT infrastructure or have any cyber security standards. As an example, Ref. [16] reported that container shipping company Maersk was hit by cyber-attack in 2017 leading to lost revenue estimated to amount to \$300 million. The revenue loss resulted from lost customer booking for 2 days as customers were not able to book. With block chain, peer to peer

shipment booking to carriers is allowed eliminating the need for freight forwarders or shipping lines' booking systems. With the increasing use of IoT and in combination with block chain technology, the different types of cargo can be tracked and current location status shared with concerned parties facilitating the detection of theft in transit.

3. Theory Development and Discussion

The current functional position of freight forwarders as middleman can be disrupted by diziastics leveraging on block chain and compatible information technology that can automate routing, shipping, scheduling, real-time carrier selection (by price or lead time), booking shipment, payment, visibility, and security assurance. Block chain technology is a distributed transaction database that makes use of nodes is encrypted as a block [17] in public ledger and complete history and can be used for: selling; buying; controlling; and settling account for freight service. A break in consensus forces other parties to either validate or update their records with latest change or reject the new addition to the public ledger once the latest transaction is discovered by network [11]. Fig. 2 compares the conceptual links between the traditional freight transport transactions and block chain transactions in international transport industry. An example of a transaction would be for the air freight transport offered by Airlines A for exporter B:

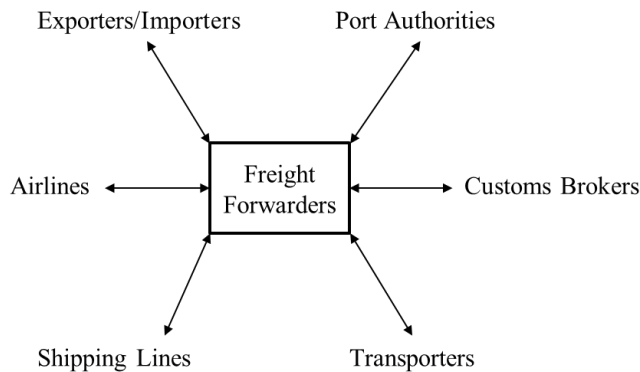
- 1) Two parties can read and write from/ to the database of each party.
- 2) Two parties agree on a transaction their selling and buying air freight service.
- 3) A block is created with details of air freight shipment of new contract.
- 4) An agreement of Airlines A to the new contract with exporter B and transaction is finalized by digital signature of Airlines A.
- 5) An agreement of exporter B to the new contract with Airlines A and transaction is finalized by digital signature of exporter B.
- 6) A cryptographic hash (The hash is used to link the created new transaction to last block in the chain) is calculated based on contract details, signature of airlines A and exporter B and previous block.
- 7) The consensus mechanism confirms transaction and updated block chain transmits to all parties in network so that all parties have a matching copy of the master ledger [11].
- 8) Airlines A receive the payment from exporter B.

An overview of the air freight service trade process using block chain is provided below to conclude our findings:

- Peer to peer transactions - Selling and buying air freight service occurs directly between peers without freight forwarders in between.
- Distributed transaction database - Each service users and providers can access the entire transaction database and its complete history directly without an intermediary within block chain network.
- Transparency for price and service users- Since the ledger is decentralized and transparent, all service users have access to every service providers' pricing policy [6]. Airlines' freight service price based on aircraft type, route and schedule is visible to service users allowing price transparency even before the confirmation of the transaction.
- Real-time data exchange - Transport and shipping documents could also be simplified and replaced with ledger entries noting, depending on sale contract terms and conditions [18]. Shipment visibility is shared to anyone in block chain network allowing its all-time management.
- Gaining confidence about payment - Service providers do not need to worry about payment from unknown service users because the contract is executed automatically once certain conditions in the contract are fulfilled in master ledger.
- Robust cyber security feature - Block chain allows peer to peer shipment booking and sharing of

transport documents that are free from cyber-attack.

Traditional Freight Transport Transactions



Block Chain Transactions in International Transport Industry

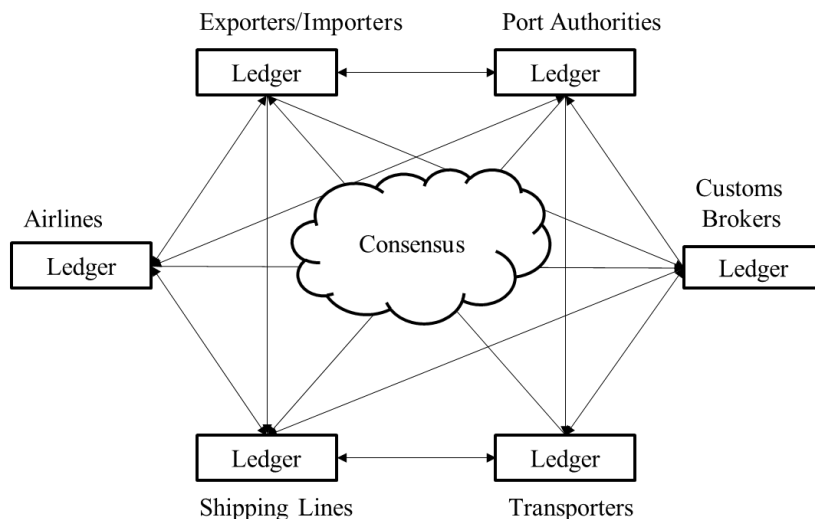


Fig. 2. Conceptual links between traditional and block chain transactions in international transport chain.

While these are not the only areas where block chain can change the existing freight forwarders' business model, they illustrate that block chain technology has a high potential in freight forwarding and international transport industry. However, in spite of the potential opportunities of block chain technology in international transport sector, there are still major challenges in the development and governance of block chain technology including: interoperability of block chain technology with multiple internal and external systems; a lack of standardization of block chain network design [11]; a complex array of regulations, maritime law and transport chain participants' multiple jurisdictions and the difficult nature of block chain and smart contract [19].

4. Conclusion

IT has become a critical innovation accelerator across all industrial sectors. Logistics and international transport industry needs to keep up with the evolution of technology to increase its productivity and competitiveness. This research identifies digistics as digitized logistics management of planning, implementation and control of transport and valued added activities while ensuring efficiency along the supply chain by using advanced digital technology. The research indicates that digistics can play a pivotal

role in transforming international transport industry by eliminating the existing freight forwarders' business model through the application of block chain technology improved and customized for all the involved parties in international transport industry. Block chain will enable more agile value chain, faster innovation and closer customer relationships [20], and specifically, block chain holds great promise for streaming transaction in international logistics and shipping commerce within the next decade [18]. This research aimed to stimulate the development of new freight forwarding business model, designed to provide alternative methods to freight forwarding transactions where there is no central actor, service users and providers do not naturally trust each other, data access must be decentralized and data protection is essential. Though dizistics and block chain technology is still a new technology in international transport industry and therefore not yet explored, the researcher hopes this paper has provided direction and will stimulate further research and development in this area.

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