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A Research On The Level Of Block Chain Awareness Of Port Managers

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ABSTRACT

Blockchain is an emerging technology that is considered by many to be a disruptive core technology. In this study, an evaluation was made on the use and awareness of the blockchain in port logistics in our country. A semi-structured interview technique was used to interview with the managers of the ports in different geographic areas of Turkey. In the qualitative research, the blockchain awareness level of eighteen port managers was determined. The participants of interview had received seven different questions by online and/or face to face. Some implications have been made on the use of blockchain in port logistics. When the answers reviewed, it has seen that the usage areas of the blockchain awareness is relatively high and especially been associated with financial transactions. At the same time, there has been no consensus observed on whether usage of this technology is beneficial. It is expected that this study will benefit researchers who want to study the use of blockchain in maritime and port logistics in the future.

Key Words: Digitization, Blockchain, Port Logistics

1. INTRODUCTION

With the development of international trade and globalization, maritime and port logistics are carried out in an increasingly turbulent environment, but gaining more importance with the deepening of global partnership. However, shipping services involve complex stakeholders and have to deal with a large number of shipping documents that slow down the process of delivering goods from one party to the other. In order for the load flow to be efficient, it must be fast, cheap and safe. In order to achieve this efficiency, it is essential that the information flow be shared quickly and accurately with all necessary parties. Blockchain technology can be used to ensure that data exchange with carriers, cargo owners and official institutions such as customs continues in an instant, secure, accessible and coordinated manner. Blockchain technology is known to contribute to improving service efficiency, digitizing maritime records, real-time monitoring of cargo status, improving logistics transparency and reducing customs clearance time. As an important emerging technology (Behera et al., 2022a), blockchain plays a role in many areas. Blockchain is gaining increasing attention across all industries and industries. It has been recognized in the literature as a groundbreaking emerging technology with destructive potential such as internal combustion engines and the internet (Kar and Navin, 2021). As such, issues related to business applications of blockchain are considered critical to both academic and social practice. Blockchain technology has been studied by a wide range of academic disciplines. There are many studies on blockchain, especially abroad. For example, while some researchers are studying the technology underlying blockchain such as distributed storage, peer-to-peer networking, cryptography, smart contracts, and consensus algorithms (Behera et al., 2022b; Christidis and Devetsikiotis 2016; Cruz et al., 2018; Kraft, 2016), some have also dealt with the regulations and laws governing blockchain related technology (Kiviat 2015; Paech 2017). Wang et al., (2019), while investigating the impact of blockchain on supply chain practices and policies, Zhao et al. (2016) suggested that blockchain will be widely adopted in finance, leading to many business innovations and research opportunities. In the current literature, applications of blockchain technology, monitoring in the supply chain (Ascencio et al., 2014), cost-effective logistics transportation (Tijan et al., 2019), IoT-based logistics industry automation (Miraz, 2020; Zhang and Sakurai, 2020), self- It has been seen that it has been extensively examined in various applications such as intelligent transportation systems (Li et al., 2018). When the theses written on the subject in our country are examined, it has been observed that the

applications of blockchain technology in fields such as engineering, information systems, finance / economics, cyber security and business are intensively investigated. Although there are rare studies in related fields such as supply chain management and international trade, studies on maritime or ports are limited. This study is original in terms of both filling a gap in the literature and addressing a current issue.

2. BLOCK CHAIN TECHNOLOGY

Blockchain is a protected and confirming database with a large number of nodes on a particular network. (Beck, 2018). Reyna et al. defined the blockchain as a transparent, distributed, indestructible and robust data structure in which the reliability of transactions made on the network by the stakeholders in the network is confirmed. The stages of this system, which can be used in money transfer, are shown in Figure 1.

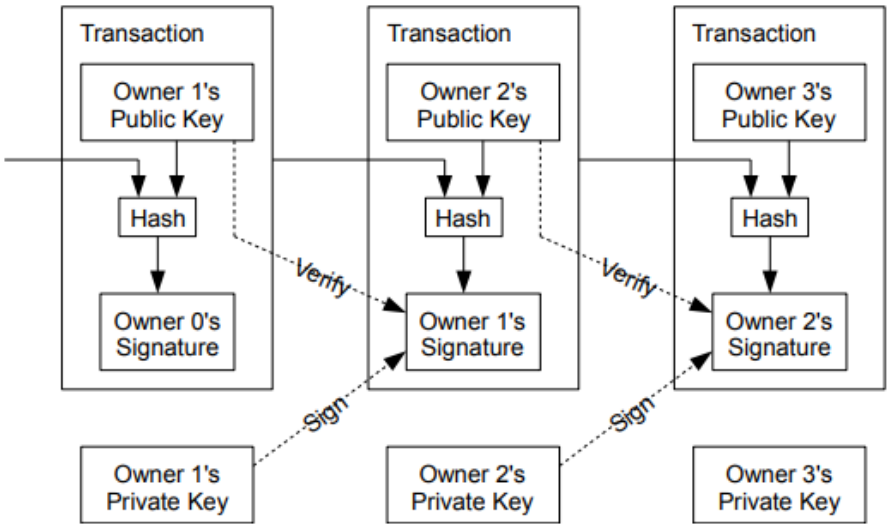

Figure.1: Transaction Flow of the Blockchain (Nakamoto, 2008)

Blockchain technology has several advantages: First, as a distributed, shared and encrypted repository, it is not affected by database changes and damages, keeps copies of the entire blockchain and allows licensees to access reliable data (Yuan and Wang, 2019). Second, it provides real-time control and enables real-time optimization for partners and organizations. Third, it facilitates decision-making at all levels in the supply chain (Zhang et al., 2020).

3. USAGE AREAS OF BLOCK CHAIN IN LOGISTICS

Today's rapidly growing global trade requires cost-effective, reliable, fast and highly reliable port operations and logistics management systems (Guisti et al., 2019; Carlan et al., 2020). Efficient logistics planning and decision making also requires the secure and transparent flow of various business documents between various stakeholders. For example, official authorities such as customs may delay or refuse a container from reaching its destination due to insufficient trade documentation (Yang, 2019). To overcome the aforementioned problems, the operations of a port terminal can be radically improved using blockchain technology (Carlan et al., 2020; Hofman and Brewster, 2019).

Digitizing interactions and information sharing has been critical to the continuity of shipping operations during the pandemic. While reducing the risk of contamination, it also helped maintain continuity in shipping operations and trade processes. The rapid distribution of technological solutions ensured the continuity of commercial activities and bureaucratic processes. It has been revealed more clearly when responding with electronic commerce (e-commerce) solutions in line with customer expectations shaped by interruptions in the supply chain of international trade enterprises (UNCTAD, 2020). According to Langer, current developments that accelerate digitalization in logistics and ports and increase the interest in blockchain technology are listed in five important items;

- ✓ Increased demand for end-point deliveries and hinterland platforms due to COVID
- ✓ The rise in smart and adaptable freight forwarding infrastructures
- ✓ Demand for digitalized finance and payment systems
- ✓ Sustainable and efficient voyages
- ✓ Supply Chain Management (SCM) continues to evolve (Langer, 2021)

Blockchain technology is definitely the most discussed topic of 2017 and it is predicted that it can greatly affect the future “port logistics” and digitization of major European and World ports such as Rotterdam. Some authorities

describe this technology as a simple distributed database that has been exaggerated by emerging organizations, while others see blockchain as a 'digital revolution' that will lead to social and economic changes. The potential of blockchain technology lies in the use and expansion of networks. This technology will connect previously unaffiliated parties, enable new forms of collaboration, and create new business opportunities (Weernink, et al., 2017).

The use of blockchain in port logistics has the potential to require transforming and, in some cases, reorganizing port processes by documenting, verifying and securing every event on the chain. Promising applications of blockchain already exist in port logistics. As this technology matures, many other applications and business models are expected to emerge over time. Similar developmental stages were observed in the first years of the use of the Internet. The most promising blockchain applications for supply chains are trade finance via smart contracts, product traceability and process automation. However, these applications require different activation conditions for large-scale application by market players, and how long this application can adapt is expected to differ from situation to situation (Weernink et al., 2017).

4. METHOD

Despite the intense interest on blockchain technology, however, there appears to be little information about its actual application in the logistics industry and its process improvement potential. This research aims to provide suggestions to the industry on the benefits of technology in terms of information flow optimization. This analysis was carried out using semi-structured interview technique. As Yin (2009:110) suggested, “how” questions were preferred over “why” questions in order to prevent defensive behaviors in the interviewee. Onwuegbuzie and Leech (2007) are of the opinion that a sample of 15 to 20 people is sufficient. In this study, 18 people were interviewed.

5. FINDINGS

While preparing the interview questions, it is aimed to reach a certain research output within the scope of the purpose and main problem of the research. The survey also includes 6 demographic questions about the participants' gender, age, experience, title, working time at the current workplace, and the types of burdens served by the institution they work for. The details of the day and time of the meeting to be held via telephone and e-mail with the participants whose details are given in Table 1 have been determined. Great care was taken to avoid distractions during the interview. Demographic information about the sample participating in the interviews is summarized in Table 1.

Table 1. Demographic information of the participants

Code	Age	Title	Working Year in the Firm	Sectoral Experience	Port Type
P1	44	Operations Director	11	16	Container, General Cargo
P2	40	Port Manager	14	14	DB, GC, LB
P3	33	Supervisor	1.5	10	All Cargoes
P4	44	Sales and Marketing Manager	4	21	Container, GC and LB
P5	35	Regional Director	14	14	Container, Ro-Ro, GC, LB
P6	42	Digital Products Manager	8	17	Container, Ro-Ro, GC, LB
P7	44	Manager	12	22	Container, GC, BC, Other
P8	55	Senior Manager	4	27	All Cargoes (including passengers and live animals) except dangerous liquid bulk cargoes
P9	39	Planning Manager	4	17	Container - General Cargo
P10	43	Shift Supervisor	14	14	Container and Dry Cargo
P11	31	Logistics Manager	8	9	Container
P12	34	Senior Advisor	9	11	Container
P13	33	Vessel Planner	9.5	10	Container
P14	42	Port Operations Manager	15	21	Finished Vehicle Logistics (FVL), Project Cargo and General Cargo with ships called Car Carrier within the scope of Ro-Ro operations
P15	37	Strategic Planning and Business Development Manager	7	14	DB, GC ve Ro-Ro
P16	30	Assistant Specialist	4	4	Container, General Cargo, Liquid Cargoes
P17	34	Port Operations Planner / Planning Shift Manager	4	12	Container, General Cargo, Dry Bulk Cargo, Project Cargo
P18	47	Consultant	1	25	Container / DB / GC / LB / Ro-Ro / Others

Direct quotations about the answers given by the managers in the port sector to this open-ended question are included. Participants were coded as P1, P2, … P18.

Question 1: In which areas of port logistics can blockchain technology contribute?

P1: At every stage of the load flow

P2: It will contribute to the transfer of valuable documents and, of course, data management, especially finance. It can be expected that it will increase port bureaucracy and reduce waiting times.

P3: Since the importance of data is very important in ports, I think it can be used actively in operation processes.

P4: Especially reporting and stock management, data analysis, pricing and production of customer-specific solutions.

P5: Efficiency and Cost

P6: Shortening the processing/approval times of the unloaded container at the ports, increasing the security in the delivery of the container to the verified cargo buyer and its representative, traceability and traceability in the process of the container's arrival from the exit port to the transfer port and the destination port, indirect improvement effect on the planning and capacity management of the ports.

P7: Simplifying Documentation, Seamless Tracking

P8: The first thing that comes to my mind is the transfer of information in port connections where the cargo changes hands. Accurate and fast transfer of information about the cargo is also an important issue in every delivery of the cargo (which is in port-connected combined transportation services. In addition, tracking fees that may occur in services can be more reliable in blockchain applications. However, it is also necessary for all stakeholders to implement the same technologies.

P9: It can be thought that the blockchain will contribute to port logistics, supply, product management, operational as well as financial issues.

P10: Ports are high-investment, private and public enterprises frequented by containers, dry cargo, liquid cargo, lng-lpg and passenger ships. It is the place where the cargo transported by road and railroad within the supply chain calls at other ports by sea, and the cargo arriving by sea is handled and distributed by road and rail. Ports also contain elements of logistics such as warehousing, container services (CFS) integrated with transportation.

P11: It can contribute to speeding up the data flow and transferring information to customers one-to-one.

P12: Trade-marketing-business development

P13: Ports, which are an important link in the supply chain, can perform their financial and operational processes more efficiently and safely thanks to this technology.

P14: As a result of digitalization, supporting port logistics with blockchain technology and being intertwined can be described as a necessity for ports to hold on in the existing destructive competitive environment. That is, the supply chain in general, or port logistics in particular, needs to keep up with digitalization due to the increasingly complex logistics processes in today's world, and the processes should be managed more traceable and transparently. Otherwise, the management of processes may be interrupted, efficiency and performance may decrease, and quality may also be adversely affected. In this case, the competitiveness of the ports will be lost and it will be inevitable for them to come out of a "existence" struggle frustrated.

P15: Ports are rather intermediate transfer points, not (except in exceptional circumstances) the first point of departure or final destination of the cargo. The cargo handled at the ports must be delivered to the ports for loading on the ships or the cargo discharged from the ships must be delivered to the destination point. Blockchain technology: It can contribute to the efficient functioning of the systems and the coordination of the processes to follow each other without waiting, ensuring optimum efficiency at every step. With the blockchain technology, it may be possible to predict the processes that will be experienced from the moment the load is included in the system until its arrival at the delivery point, and to make healthier and more efficient plans for each step.

P16: As a faster, safer and more accurate data flow can be achieved with this technology, faster and more accurate transactions can be performed in customs procedures such as inspection x-ray and loading and unloading processes.

P17: Digital transformation is now an inevitable end for human beings. When we consider Port 4.0 smart ports and digital transformation with its main objectives, it actually provides service delivery, customer satisfaction,

cheaper port operations costs, fast and quality service, and more effective communication to stakeholders in digital transformation. (Unfortunately, service slowdowns and disruptions still continue due to documented procedures today). I think it will also contribute to areas such as value-added service production.

P18: It can contribute to the prevention and easy tracking of valuable documents such as document management, certificate of origin, bill of lading. In addition, monitoring of port processes will be beneficial in terms of monitoring and visibility of customs clearance processes.

6. RESULTS

It is inevitable that digitalization, which we encounter more and more in all areas of our lives, will be used in all areas at sea ports. Creating or being involved in digital ecosystems is an important step towards digitization for ports. According to the results obtained as a result of the interviews, it was understood that the managers are aware of the blockchain and their awareness level is high. In fact, it was seen that the use of blockchain in ports was defined as "necessary" by some participants and as "unnecessary" by some participants. It has been understood that the use of blockchain technology is especially important for issues such as correct data flow, non-disruption of paperwork procedures, monitoring of port processes, and customs clearance processes. Blockchain technology can be used to ensure that data exchange with carriers, cargo owners and official institutions such as customs continues in an instant, secure, accessible and coordinated manner. Ports, which are the centers where the transition is made between different transport modes, have a very important place in this data flow. In order to ensure fast and secure data flow, it is inevitable to use digital methods. A port with a digital data flow infrastructure can provide instant interaction with all interested parties by creating a virtual ecosystem or by being included in an ecosystem.

Thanks to its typical features, blockchain technology is thought to add value to port logistics and port digitization in various ways. These can be addressed as building trust, providing secure data, increasing visibility, increasing communication and integration into supply chains. It is recommended to obtain more comprehensive information through in-depth interviews on this subject in the future. In addition, it is important to concretize the subject by giving examples from the world and our country. It is also among the suggestions of the study to mention the obstacles in front of the spread of the blockchain in the studies to be done.

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