Possible valuation and understanding of a blockchain enabled supply chain platform

Decisionmakers at Swedish BCO: s and FF: s understanding and valuation, a case study in collaboration with Maersk

Bachelor thesis for International Logistics Program

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PREFACE

This paper is written as part of the authors bachelor thesis in International Logistics at the Swedish Chalmers University of Technology, in collaboration with Maersk. The authors would like to thank everyone involved who helped make this thesis a reality. A special thanks to our handlers Martin Larsson and Lars Green, as well as our Maersk representatives Monica Ahlström and Mo Alghali. Lastly, we would also like to thank our respondents for taking their time to participate in the interviews.

Felix Andersson & Jesper Rosenberg, 2022

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SAMMANDRAG

Detta är en fallstudie som görs i samarbete med Maersk på den svenska försörjningskedjan med varuägare och speditörer gällande BSP (blockchain aktiverade försörjningskedjeplattformar). Blockchain brukar nämnas i ett flertal marknader, bland annat logistikmarknaden. Dock verkar få veta vad det egentligen är. TradeLens, som är en ”blockchain enabled shipping solution” (IBM, 2018) används som huvudexemplet genom hela studien för att representera sådana plattformar. Enligt anonym personlig kommunikation med chef på Maersk (2022), så råder det en bristande förståelse bland de tänkta användarna av BSP: s när det kommer till den technologin. Detta är varför fallstudien har undersökt förståelsen och värdesättning av BSP hos varuägare och speditörer i försörjningskedjan, för att alltså få reda på om det verkligen är kunskapen som brister. Via intervjuer kunde studien påvisa att det fanns indikationer på bristande kunskap gällande BSP: s inom marknaden. Vilket gjorde det svårt att jämföra deras värderingar gällande BSP när kunskapen brast. Dock trots den bristande kunskap, så var deras värderingar relativt lika inom de områden som BSP:s täcker, med några få undantag.

Det fanns indikationer av kompabilitetssvårigheter mellan produkten och dess marknad gällande användning, applicering och förståelse. Det kunde därför dras en slutsats till att aktörerna inom försörjningskedjan behöver utveckla sin digitala användning för att kunna förstå och använda en BSP som den är tänkt. Dock, eftersom de tänkta användarna för tillfället inte kan införa och applicera det, är produkten verkligen tillräckligt utvecklad?

Nyckelord: Blockchain, TradeLens, försörjningskedjan, synlighet, dokumenthantering

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ABSTRACT

This is a case study in collaboration with Maersk, conducted on the Swedish supply chain market with beneficial cargo owners (BCO) and freight forwarders (FF) regarding BSP (blockchain enabled supply chain platforms). Blockchain tends to be commonly spoken about in a variety of markets, including logistics, though few seems to know what it actually is. TradeLens, a blockchain enabling shipping solution (IBM, 2018) is used as the main example throughout this study to represent these types of platforms. According to anonymous personal communication with a manager at Maersk (2022), there seems to be a lack of understanding of blockchain and BSP: s among the intended users. Which is why this case study has investigated the understanding and valuation of an BSP among BCO and FF: s in the supply chain. Through interviews the study could establish that there were indications of a lack of knowledge within the market. Which made it difficult to compare their BSP valuation. Though within the BSP covered areas their valuation was quite similar with a few exceptions.

There were indications of compatibility issues between the product and its market revolving usage, application and understanding. It was concluded that the actors within the supply chain needs to further develop their digitalization in order to comprehend and utilize a BSP as intended. Though since the intended users are currently not able to adopt and apply it, is the product truly enough developed?

Keywords: Blockchain, TradeLens, Supply-chain, Visibility, documentation handling.

TABLE OF CONTENT

ACRONYMS AND TERMINOLOGY

API – Application Program Interface

BCO – Beneficial Cargo Owners

BCT – Blockchain Technology

BL – Bill of lading

BSP - Blockchain enabled supply chain platform

DLT - Distributed Ledger Technology

e-BL – Electronic bill of lading

EDI – electronic data interchange

ETA – Estimated time arrival

e-waybill – express electronic waybill

FF – Freight forwarder

1. INTRODUCTION

Blockchain technology (BCT) seems to be a commonly touched upon subject in a variation of markets in today's society, though few seems to know what it actually is. BCT is the underlying technology to the cryptocurrency of Bitcoin that was introduced in 2008 (Nakamoto, 2008). An important note that Yaga et.al (2018) points out in their book "*Blockchain Technology Overview"* is that BCT is not the entire solution, it is merely a springboard for further platform development. It is also the technology to which the shipping solution platform of TradeLens was developed from. It was initially founded and implemented into the global supply-chain ecosystem by IBM and Maersk in 2018 (IBM, 2018) and into the Scandinavian market in 2020 (Anonymous personal communication with manager at Maersk, April 28, 2022).

There is a vast amount of literature on blockchain, though most of it focuses on its implementation in the world of cryptocurrency (Zeng et. al, 2017). Blockchains architecture and technological aspects will be elaborated, though focus lays on its correlation to *blockchain enabled supply chain platforms* (BSP) and its application within the supply chain. This study will use TradeLens as an example to represent similar BSP: s, though they are currently rare.

Since TradeLens was launched, a vast number of global actors from the supply-chain industry have affiliated themselves with TradeLens. Although according to anonymous personal communication with manager at Maersk (2022), the Swedish market seems to be somewhat resilient to its adoption of TradeLens. Which according to Maersk may be due to the lack of knowledge of the product, its benefits and value offer among the intended users. Therefore, this paper will try to identify the *beneficial cargo owners* (BCO: s) and *Freight forwarders* (FF: s) understanding of a BSP.

According to personal communication with manager at Maersk (2022), there also seems to be a lack of understanding of which values within a BSP that the different supply chain actors prioritize. Which is why this study will also investigate BCO: s and FF: s valuation and possible variation of valuation within four areas related to a BSP. These are, transport and cargo visibility, information and documentation handling, security, and digital development. In other words, what is it that a BSP could provide to the market and how does the market stand towards the use and development of BPS: s.

To investigate these questions, individuals with two main types of employments from Swedish FF and BCO companies will be interviewed in this case study. These individuals work with either purchases or logistic operations and are in daily and direct contact with the supply chain. Meaning that they have at least a foundational knowledge of the practical ways of the market within the BSP covered areas.

1.1 Background

This is a case study written in collaboration with Maersk around the concept of BSP: s, where TradeLens is used as the main example for similar constructed platforms throughout the study. The main reason for this is that there are no other BSP: s available on today's market besides TradeLens and GSBN. GSBN was initiated by the Chinese COSCO shipping company in 2021 (GSBN, 2022) and has limited information available to the public. Though there exist a large number of platforms within the supply chain that does not use blockchain, such as the visibility platforms of "Project 44" (Project 44, 2022) and "Shippeo" (Shippeo, 2022) among others.

Only a few case studies have been conducted on TradeLens and none could be found for GSBN. There are also a limited number of papers and research conducted on the BSP concept at today's date. Additionally, according to Zeng et. al, (2017) most of the scientific research papers on BCT has its focus on other areas than the supply chain.

Since the market is resilient, there also seems to be a lack of understanding of the intended users decisionmakers valuation in a BSP concept. Since the purchasers and logistic operators are usually part of the decision-making process of acquiring platforms such as the BSP: s for FF: s and BCO: s (Anonymous personal communication with manager at Maersk, 2022). Their personal valuation of BSP covered areas could bring value to both the intended users and the BSP developers. Ultimately, this may also lead to actors understanding and realizing for example, how similar companies' thinks of the market's digital development.

A BCO company, as the name implies, is essentially the owner of the cargo in question (A, Young, 2019). BCO: s does not often handle the transportation by themselves, but rather outsources a transportation intermediary as their representative. These often comes in the form of third-party logistics service providers, FF: s, and non-vessel operating common carriers (Cannizzaro et al, 2018). The BCO then physically retrieves the cargo at said destination. (CMA CGM, 2021).

These different ocean transportation intermediaries are explained by Cannizzaro et al (2018) as chain integrators. Meaning organization of the maritime- and land transport, which could be just part of the chain or the whole door-to-door chain. Freight forwarders utilize experience and contacts to find a suitable transporting companies and routes for the one in need of the transport (Adnavem, 2022).

This case study will be interviewing individual purchasers and logistic operators within these companies. As they are usually part of the decision-making process of acquiring platforms such as a BSP and are in direct and daily contact with the supply chain. (Anonymous personal communication with manager at Maersk, 2022). A purchaser makes decisions and inquiries on behalf of their company (Indeed editorial team, 2021). The logistic operators serve as coordinators between suppliers and customers to efficiently make sure the cargo arrives where and when it should (M. Dowd, 2020).

1.2 Aim of the study

The main aim of this study is to investigate the intended users of BSP: s understanding and valuation of it. TradeLens will be used as the main example to represent BSP: s throughout the study. Some of TradeLens possible value offers will be reviewed with the help of prior hypothetical and non-hypothetical case studies. The data gathered from the interviews regarding the BSP areas will then be compared and analyzed together with the attained data from the theory section to provide both a theoretical and practical approach to the study.

Since there seems to be a lack of understanding of BSP: s among the intended users, the study will be providing an explanation of blockchain and its correlation to TradeLens. This by elaborating some architectural features of blockchain as well as its implementation in the supply chain through TradeLens. This can be seen as a secondary aim of the study in order to lay a foundation for answering and understanding the main aim.

By investigating the valuation of supply chain actors decisionmakers, the report will try to establish what supply chain-based values they prioritize and how they stand towards a BSP. This within the following BSP covered areas: transport and cargo visibility, information and documentation handling, security, and digital development.

In order to attain a variated view from actors working with different parts of the Swedish supply chain. Investigating this matter will be done through interviews with purchasers and logistic operators with an average industry experience of 12 years within Swedish based BCO and FF companies. Their statements and standpoints will then be analyzed.

1.3 Research questions

RQ 1: How is TradeLens correlated to BCT?

RQ 2: How does the understanding of a BSP look at BCO: s compared to an FF: s?

RQ 3: How does the valuation of a BSP look at BCO: s compared to an FF: s?

1.4 Delimitations

The report delimitates itself from investigating companies and decisionmakers based outside of Sweden. Although the theory and literature are gathered without being country restrictive and some of these companies may operate outside of Sweden. This report will only take two types of companies into consideration within the supply chain, namely, BCO and FF. There are numerous decisionmakers within a company, but this report delimitates itself from interviewing and analyzing any other company employments besides logistic operators and purchasers.

The report will not provide a thorough explanation of BCT and its algorithms since its only relevance is its correlations towards the supply chain systems. This means that the reports focus will not be on exploring all possible advantages with BCT but only those directly correlated to the subject. Nor will the report elaborate the possible disadvantages with BCT since the focus lies on the possible valuation within a BCT based supply chain system.

Since the report is written in collaboration with Maersk, the respondents may be slightly more oriented around shipping transport, but the report does not delimitate itself from other transportation modes.

2. THEORY

2.1 Blockchain

Blockchain was introduced as the underlying technology to which the crypto currency of Bitcoin was created upon in 2008, although it is not to be confused with only cryptocurrency (Nakamoto, 2008).

There are multiple definitions of BCT made by different authors, though there is yet to be a single generally accepted definition (S. Seebacher, R. Schüritz, 2017). A "Public digital ledger" is one frequently used, and it provides the possibility of removing the central authority or third party (i.e., banks, or government). This makes transaction directly in between a public community of users possible (Yaga et.al, 2018). A key understanding regarding BCT is its immutability (Zheng et.al, 2017), meaning that once information and transactions are recorded, they cannot be altered or tampered with. Therefore, blockchain is trusted to be part of financial transactions.

An important note that Yaga et.al (2018) points out is that BCT is not the entire solution, its merely a springboard for further platform development. Which can take different directions and be used within different areas depending on the developer's needs. For example, shall the BCT network be "*permissionless*" and give everyone access to the information and permits to make edits? Or should it be "*permissioned*" and only allow specific actors to do so? (Yaga et.al, 2018). Permissioned blockchain needs some form of central authority to provide these authorizations among the relevant actors. The authorizations for a specific network can be added or revoked if needed by whichever entity is in control of the network. This can be a single entity but does not have to be. Either way, it would require other actors to put their trust in it. To put this into an example, if two (or more) organizations or companies would like to cooperate but lack trust in one another. These two could create a permissioned network together with transparency and then invite further business partners to take part of this network. While together remaining in control as the authority of the network. (Yaga et.al, 2018)

There are three major types of blockchain: public, private, and consortium (Zheng et. al 2017). In a **public blockchain** all information and records tracked are open for anyone to see and the set-up of the consensus process is determined by the public. The consensus model will be elaborated in the "Architecture and application" section. For a **private blockchain**, only those within the owning entity of the chain would be allowed to be part of choosing the consensus model. Since they are the sole actor in control of a centralized chain. **Consortium blockchain** has a predetermined group that sets the consensus since it is not a single organization or entity that owns the chain but several organizations, which makes it partially decentralized. Both in consortium and private, it is up to the owning entities to decide if the information stored on the chain should be open for the public or not. They are also permissioned in contrast to public blockchain which has a permissionless set-up (Zheng et. al, 2017). According to Precht and Gomez (2022) the private blockchain generally provides both better privacy and performance compared to a public one. They also state that there does exist issues regarding privacy in general for blockchain systems.

2.2 Architecture and application

Blockchain is essentially a “continuous sequence of blocks” (Zheng et al, 2017, s.558) forming the shape of a chain.

When implementing and using BCT, a consensus model needs to be agreed upon. There are multiple types of consensus models to choose from but essentially, they all decide which actors are to add the next block to the chain. In other words, what rules this specific blockchain is obliged to follow. This is to prevent any possible disruptions within the chain and to provide trust in the network (Yaga et al, 2018). This consensus model is then recorded in the “*Genesis Block*” to which all the following blockchains are built upon, and since this is the first and original block, it does not have (nor contain) a *parent block*.

So, the chain consists of the blocks, but what does the blocks contain? Besides the previously mentioned *genesis block,* which is an exception, all blocks can be divided into two parts, *body,* and *header*. The header consists of 6 parts although this report will only elaborate four of them.

(i) **Hash**: Each block has a unique hash number representing the blocks data.
(ii) **Parent block hash**: Each block also contains the previous block in the chains hash number, the previous block is sometimes called parent block.
(iii) **Block version**: Indication of what rules the block is following.
(iv) **Time stamp**: The universal time showed in seconds since January first, 1970.

The two remaining parts are: *nBits* and *Nonce* (Zheng et al, 2017) which is not deemed vital for this study.

As previously mentioned, BCT is often referred to as “a public digital ledger “, a ledger can be defined as a “collection of transactions”. This brings us to the body part of the block. Also referred to as block data, this part contains a transaction or an interaction between actors, which can vary depending on the blockchain usage.

2.3 Documentation handling

BSP: s acts around the international transportation of goods which is deemed as highly complex (Zijm, et al, 2019) and so is the documentation needed for it. Crossing borders for example may not sound so difficult, but different countries have their own culture, jurisdictions, and rules, which also applies to transportation of goods. Not to mention custom regulations.

Rama Gopal (2006) divides the needed documentation into two parts, commercial- and regulatory documentation. The commercial documentation aims to the physical transport of the goods, as well as the exchange of the juristic ownership of goods to the buyer. A standardization has arisen which includes 14 different documents, such as: Bill of lading, commercial invoice, packing list, possible certifications, shipping advice, certificate of origin, bill of exchange to name a few. Rama Gopal (2006) then continuous to explain that the

regulatory documentation, as the word implies, are documents aimed to comply with rules and regulations of laws for freight documentation.

There are multiple conventions for different transportation modes stating what is expected during transports as well as the description of basic transport documentation. Such as those documents mentioned above. An example for a convention would be the Hauge – Visby convention that specifies in ocean transports, or the Montreal convention for air transports (Zijm, et al, 2019). These conventions can then be ratified by the countries.

The freight documentation should also contain the rights and responsibilities of the involved parties, who arranges the transport, who bears the risk of the transport and when it is transferred to the other party (Zijm, et al, 2019). This can be covered in something called incoterms, which is described by the international chamber of commerce (2020) as regulations for businesses that has been recognized on an international level. By referring to these regulations, it can clarify the misunderstandings that arises between the buyers and sellers, which saves both time and money.

Without the proper and correct documentation for a transport, the goods will not be allowed to move, which could cause delays and costly charges. Besides what has already been mentioned, and depending on what is being transported, and where it is being transported to, the documentation may be concluding even more information (Zijm, et al, 2019).

A shipment moving internationally could reach up to 200 documentation exchanges related to its movement which previously has all been done in a manual manner. Though more and more are being digitally converted which saves both time and money for the involved parties (G. Zomer, 2019).

Madhani (2021) mentions that it is important for organizations to be able to quickly adapt their supply chain structure when problems arise, for example, in the case of the Covid-19 pandemic. He mentions that this is something that most organizations struggle with since there is a lack of integrity when it comes to sharing data and visibility with customers or suppliers. Which is mentioned to be mostly because of untrustworthy supply chain structures. Madhani (2021) explains that this is one of the main reasons for why companies should adopt new technologies such as blockchain and work on digitalizing documentation handling.

2.3.1 Bill of lading and electronic bill of lading

Bill of lading (BL) is a type of documentation that can be described as a receipt for the transported goods and a contract for the carriers. It is deemed to be the most important document for a freight transport (S. Wunderlich & D. Saive, 2020). This contract proves that the goods were taken by the transport and makes the transporters obliged to deliver said goods to a predetermined destination. BL is a negotiable document of title in paper form which means it can also be used to enable rights transfers of the goods in question (H. Precht, J.M Gomez, 2022). The banks can also use the BL as a letter of credit between the buyer and seller (S. Wunderlich & D. Saive, 2020).

Using paper documentation takes a lot of time and money, according to a UNCTAD report (2022) transport documentations accounts for 5 – 10 % of the total transportation cost. Originating from the classic BL then came the *electronic bill of lading* (e-BL) which fulfills

the same purpose but in a digital form instead of the previous paper form. This is both cheaper and more time efficient (S. Wunderlich and D. Saive, 2020), although the market is still mostly manual in its documentation handling. Precht and Gomez (2022) states in their summary that "approaches towards the concept of e-BL lacks privacy and that antitrust law are not yet considered" (H. Precht, J.M Gomez, s.307, 2022).

2.3.2 Waybill and express electronic waybill

Waybill or *sea waybill* are somewhat similar to a BL although a waybill does not have to be presented to obtain the goods in question (A. Mitchelhill, 1990). The waybill can be issued instead of a traditional BL as an "document of optional simplicity" (A. Mitchelhill, s.46, 1990) but still serves as a receipt and contract for the carrier to deliver the goods to a specified consignee at a destination. It contains consignment information like goods type, quantity, destination, involved actors and terms of transport among other things (S. Bakhtyar, 2016). It is not a negotiable document so there can be no rights transfers of the goods using it. Although the major benefit of using this instead of a BL is as earlier mentioned, that all you need to receive the goods is proof of identity of the person listed on the waybill. This means that it does not have to be produced and can therefore avoid something like a demurrage cost which could have arisen from waiting on a BL to arrive. Important to note is that a waybill should not be used as a replacement for BL, but as an addition (A. Mitchelhill, 1990). Waybill documentation is in paper form but there are initiatives to replace this with an *electronic waybill* (e-waybill). These should contain at least the same information as the paper form (S. Bakhtyar, 2016).

2.3.3 Digitalization and cyber security

The BSP of TradeLens and similar supply chain-based platforms are digital, and digitalization is a topic the supply chain industry is well familiar with. According to Zijm et al, (2019) it has had a tremendous impact during the last decades, especially within the operational process on the supply chain. It eases both planning communication and enables faster and more efficient actions to be taken (K. Piu Liu, & W. Chiu. 2021). It has made the supply chain operations both easier and more cost efficient (Zijm, et al, 2019). Though being digital has its perks, it also comes with its own deficiencies. K. Gupta & K. Goyal (2020) explains the different possible threats to information systems and divides them into different categories. The first two major categories are divided into natural causes and human causes. Natural threats to information systems could be natural disasters, fire, floods, or electricity malfunctions from i.e lightning and so forth. The human causes are then further divided into intentional and unintentional. The unintentional can be seen as the human error, where they by accident inflict some type of damage or cause harm to the information system. Examples for this could be by simply providing information to the wrong person, ticking the wrong box or miss spelling. Intended harm to the information system on the other hand are described by K. Gupta & K. Goyal (2020) as "Malicious intent". Like cyber-attacks, which could aim to achieve theft, access valuable information or just simply damage the hardware or software used to handle the information and communication. Zijm, et al, (2019) Also explains how important it is to note that digital failures can also occur unintentionally, by for example failed software updates or server crashes.

The blockchain as previously mentioned is used as a countermeasure to these and to increase the overall digital security, although it does not remove the risk entirely. The human error will still be a possible source of threat, though it might decrease the risk.

2.3.4 Visibility

Visibility is one of the areas covered within a BSP and a variety of other supply chain platforms. The supply chain has varying degrees of visibility between the different partners, which is described as transparency by Bartlett et al (2007). Their study also mentions that visibility is a crucial factor for the speed of which actors are able to deliver information. The faster the information travels, the more accurate it is. A lack of accurate information can cause negative consequences in the supply chain networks. As mentioned, a BSP such as TradeLens focuses on the network and actors' information sharing, which is why visibility plays such a crucial part.

2.3.5 Application programming interface

Piccioni et al (2013) describes *application programming interface* (API) as the foundation for communication between computers and the ones that are programming them. Putting this into the supply chain perspective, the person utilizing or “programming” the API can be anyone that needs to transfer information to other actors. A BSP utilizes API: s in order for the actors within the same network to communicate with each other. Lalchandani et al (2021) explains that these actors can be divided into three different key parties. These are the holders/wallets, the verifier, and the issuer. To put this into the perspective of this study, the holders/wallets could be explained as the buyers, suppliers, and sellers. The issuer is the party which sets up the supply chain and the verifier is the platform which verifies the transactions.

In order for all of these actors to be able to trust each other, they use the same identity providers to work as an authenticator for each participant.

Lalchandani et al (2021) writes that when it comes to the definition of API, it largely depends on the operation model. These models could for example be centralized, self-sovreignety or user centric. The last two is connected to the decentralized concept which can be largely connected to the blockchain technology as well as the distributed ledger technology. These technologies have no authorities which regulates it, such as the centralized models.

The API: s that are the most useable are those that requires less browsing of documentation, these are more intuitive and have reusability according to Piccioni et al (2013). This in its turn leads to a much easier work environment for the users, thus making them more productive. Conversely, Piccioni et al (2013), mentions that API: s that aren´t as usable worsens the quality of the productivity in general.

2.4 Previous case studies

Both real- and hypothetical case studies on TradeLens has been done earlier by other authors that mentions their opinions on its use case and potential value creation. The researchers have not found any case studies done on other BSP: s except for TradeLens. However, they thought that it would still be useful to compare the result in the case studies done below with the respondent's answers.

2.4.1 Previous case study on TradeLens

The study "realizing value from voluntary business-government information sharing through blockchain-enabled infrastructures: The case of importing tires to the Netherlands using TradeLens" by Rukanova et al (2021). Goes into how BSP: s (in this case TradeLens) can be of use on a global scale and how they can create value for governmental authorities. They specifically put their attention on a case of importing tires from China to the Netherlands. Which means that only the exporter, importer and the customs were involved in the study. The answer that they wanted to find was what value the business-governmental information sharing through TradeLens would create for the different actors (Rukanova et al, 2021).

The conclusion of the study was that, when it comes to international trade, it is more important for value creation to focus on the problems such as immutability and the audit trail of data/documents on the blockchain rather than decentralization. Which is often mentioned as one of the core benefits with blockchain. Further on they explain that even in simple cases such as this example, making the technological design options easily understandable is critical. This to be able to understand how voluntary sharing of information (i.e early sharing of the final documents) creates public value. It brings public value such as an increase in effectiveness, efficiency, reduction in administrative labor and better transparency (Rukanova et al, 2021).

2.4.2 Hypothetical case study

In the study "A Distributed Ledger Technology (DLT) Approach to Monitoring UF6 Cylinders: Lessons Learned from TradeLens", Gasser takes up the problem of finding the UF6 cylinders if they go missing during transportation and that it could take several weeks before they are located. The World Nuclear Transportation Institute (WNTI) released guidelines to try and solve this problem. The study wants to propose an addition of *digital ledger technology* (DLT) to the guidelines implemented, to be able to monitor the UF6 cylinders even better throughout the nuclear industry. The study goes deeper into why DLT and more specifically, the lessons learned from TradeLens could benefit the nuclear industry. TradeLens could improve how the industry shows transparency, monitoring in real-time, improved efficiency, improved security across the globe (P. Gasser, 2019).

He concludes the study with the overall picture that a DLT, such as TradeLens could hugely benefit the nuclear industry when it comes to efficiency and monitoring. It would provide real-time data with more comprehensible information about the nuclear material, which is crucial to have when it comes to such dangerous and sensitive goods since the company can be more adaptable. A DLT would also provide a trustworthy history that always gets updated,

which has the potential to increase transparency and trust within the industry (P. Gasser, 2019).

The only negative thing mentioned by Gasser, is that it seems that the DLT is not fully developed yet, which could provide some problems, although it's a constantly evolving technology. But all in all, he thinks the nuclear industry should join the DLT solution as fast as possible, because there are more to miss out on if the industry waits rather than joining before the technology has been perfected. If they join in earlier, they can help shape and evolve the technology (P. Gasser, 2019).

3. METHODS

3.1 Research question's structure

This paper is based upon three research questions with a structure that can be viewed as a funnel with RQ1 at the top and RQ3 at the bottom. **RQ 1**: *How is TradeLens correlated to blockchain technology?* This question works as a foundation for the remaining two questions and is also meant to provide an overview explanation of the subject at hand, since there seemed to be a lack of understanding. Research question **RQ 2**: "*How does the understanding of a BSP look at BCO: s compared to FF: s?"* and **RQ 3**: "*How does the valuation of a BSP look at BCO: s compared to FF: s?"*. Though they cover similar areas, it was deemed necessary to assess their understanding of a BSP in RQ 2 before investigating their possible valuations in RQ 3. The valuation will also determine their standpoint towards the BSP development of its covered areas.

3.2 Literature overview

Chalmers database "*Chalmers open digital repository*" was used in search for former student theses on BCT, BSP: s and TradeLens to see what had already been written about within our chosen subject. These were also read to find possible relevant and useful sources of information for the report.

The main search engine used for finding relevant sources was Chalmers University library's digital database (lib.chalmers.se). Although through this database a variety of academic sites were used to gather information for the study, including, Springer Link, Scopus, IEEE Xplore and Emerald.com. While utilizing these, specific source types were selected, such as, academic journals, books/e-books, conference materials, and whitepapers. These were then reviewed and evaluated. The following search words were used in different combinations to find the sources:

Blockchain, blockchain application, blockchain architecture, blockchain technology, TradeLens, waybill, electronic waybill, bill of lading, electronic bill of lading, supply chain platforms, API, transport, visibility.

The reviews were conducted by reading headlines, abstracts, keywords, and summaries which upon a decision was taken whether they could be of use or relevance for the report. Based on this decision those deemed useful was then further evaluated. This was done by examining if the source were [1] topical within the subject, [2] written and published by a trusted authority / author, and [3] objective. If the source was deemed useful and appropriate for use in this report, it was reviewed more carefully by skim reading and for some, a thorough reading.

3.3 Case study approach

This study was conducted with 6 respondents and answered “how” and “why” questions, which made the case study approach the most optimal, according to Yin (2009). This approach also fits when it comes to dealing with contemporary events, I.e., events that are relevant in the present (R. K. Yin, 2009), which correlates to the subject of this report.

The case study approach has a holistic point of view, meaning that it views the case in its entirety and can therefore discover how different relationships and processes are connected to each other (Denscombe, 2014). This relates to this study that wants to find out the different relationships between decisionmakers at BCO: s and FF: s towards TradeLens.

The advantage with the case study approach is that it allows the researchers to use different types of data collected through quantitative and qualitative methods, as well as enabling the options of using different methods in the investigation (Denscombe, 2014). This allowed the researchers to use the qualitative method of interview as its main source of gathering data. As well as using a collection of data through scientific reports as a foundation in the report and for the interviews.

The study also compares its result with previously done case studies, both real and hypothetical case studies. The reason for this comparison is to find out if the results in this paper will have similar viewpoints or if they will differ, and what the reason for that could be. From the searching for different case studies regarding TradeLens, it became evident that only a few exists, which is why only these two cases were investigated.

3.4 Case description

As mentioned in the introduction, TradeLens is used as the main example of a BSP throughout this study. BSP: s are currently rare and to the authors knowledge, there are only two available on today's market, TradeLens and GSBN.

TradeLens was introduced to the Scandinavian market in 2020 according to anonymous manager at Maersk, (personal communication, April 28, 2022). Although it was first introduced as a co-creation by IBM and Maersk in 2018 (IBM, 2018).

According to anonymous person (personal communication with manager at Maersk, April 28, 2022) the Swedish supply chain market has been somewhat resilient to TradeLens compared to other European countries. Which anonymous personal communication with manager at Maersk (2022), explains may be due to a lack of understanding of BSP: s among the different intended users within the supply chain. The supply chain can be described as a downstream and upstream relationship with customers and suppliers (Bartlett et al, 2007).

The purpose of TradeLens (2022), as described by them, was to apply the blockchain concept onto the world of global supply chain. IBM (2018) describes TradeLens as a blockchain enabled shipping solution, that is designed to be more secure as well as more efficient than the traditional methods used in the global trade. Maersk (2022) describes TradeLens as “an open and neutral industry platform underpinned by blockchain technology”, which is similar to the description TradeLens has for their own platform (TradeLens, 2022).

IBM: s blockchain technology acts as the foundation for the digital platform of TradeLens. Which gives the involved and authorized actors a shared view of the transactions without the risk of privacy and confidentiality being compromised (IBM, 2018).

The TradeLens concept consists of three components (TradeLens, 2022). The first component is the **Marketplace**. Which works as an open service and application, where third parties and TradeLens themselves can publish services. Secondly, the **Platform**. The platform uses an open API with open standards which makes it accessible for the whole ecosystem. It also uses IBM: s cloud and is being powered by their own blockchain technology called Hyperledge. Lastly, the **Ecosystem.** TradeLens business ecosystem is the foundation of the platform, which includes actors such as the carriers, ports, terminals, ocean carriers, freight forwarders, government authorities, customs brokers, etc. Each one of these actors shares information on the platform that can be stored, used to take actions, and be tracked throughout a shipments journey.

TradeLens uses a private and permissioned based BCT which allows only specific authorized actors to use, edit and view data. The intended values of TradeLens comes from its members sharing information with each other on the platform. It is a completely neutral platform with open APIs (that can be integrated with the users own system), which makes it available to any actor that wants to send a shipment (TradeLens, 2022).

TradeLens (2022) states that their possible value creation could be visibility through: end-to-end visibility in the supply chain, real-time access to information via open APIs, greater predictability, improved planning utilization, and tools for customs clearance among others. It could also provide network and connection improvement with different actors in the TradeLens ecosystem. As well as less manual paperwork and increased security and trust within the platform. The interviews were then conducted with TradeLens as its reference point to investigate the market and its intended user's valuation and understanding of BSP: s.

3.5 Respondent Sampling

A larger research was not feasible for this study and therefore the research was conducted with an exploratory sampling method. Which generally represents a smaller scaled research for relatively unexplored topics (Denscombe, 2014). This paper also used non-probability sampling and researcher influenced selection to attain more accurate data and insight among the Swedish BCO: s & FF: s. Since BSP: s are relatively new and complex, the respondents needed to have some prior fundamental knowledge of the market and the BSP covered areas.

The purposive sampling was done through Maersk since they had prior established contacts among BCO and FF companies. For the sample size, a smaller scaled pragmatic approach was determined to be most reasonable for the study, based on the limited resources available to the researchers. In total, 12 individuals were approached with a short introduction of the thesis when asking for their participation. Of these 12 individuals, 6 agreed to participate in the interview. Once they had agreed, a short informative introduction of the thesis was submitted to them, together with the subjects that the interviews would touch upon (Appendix, 1).

The individuals that agreed to participate had an average work experience of about 12 years within logistics and the supply chain market. Their experience was a deciding factor for the influenced selection. The preliminary demand for the respondents was that they were either working as a logistics operator or purchaser. Though their exact employment within these roles tended to slightly vary, for example some were managers, other directors and so forth.

3.6 Interviews

The study used semi-structured research interviews as a method for gathering data, since the topic is rather complex and the study in need of elaborative answers. This also provided the opportunity for further development of the questions during the interviewing process, to increase the data relevance (Denscombe, 2014).

The interviews were one-on-one based to provide a safer environment for each respondent. This in order to protect their personal interests, encourage them to speak freely and to make sure each respondent could properly answer each question without interruptions. All interviews were audio recorded with the respondent's consent, complemented with field notes by the researchers. The preferred way for interviews was in person but due to current circumstances with Covid and limited resources, these were supplemented with online interviews. The lengths of the interviews varied between 20-40 minutes.

The individuals participating in the interviews were given a letter and a number for when referred to. The letter stands for the type of company the respondent operates within and the number is to distinguish them from each other. For example, a BCO respondent can therefore be referred to as "B1". An FF respondent can be referred to as "F1", or "F2" etc.

3.7 Ethic

All the individuals participating in the study have voluntarily agreed to participate in the interviews by signing an informed consent. The letter of consent was sent out to the respondents before the interviews were conducted, together with the previous mentioned information and thesis introduction. The letter of consent can be seen in (Appendix, 2).

The authors decided that all interviewed respondents and their respective company shall be presented as anonymous at all times, which were signed by both parties in the informed consent form. This means that the specific position of each respondent as well as what company they work for will not be disclosed in order to ensure their anonymity. Although the different positions that were interviewed varied between purchaser, importer, logistics manager and vice president of the company.

3.8 Analysis

Since a BSP covers multiple different types of areas, it was decided that dividing the analysis to these would provide a clearer overview and help to distinguish connections and variations by the respondents. Therefore, it was decided that the foundational analyzing method in this

study were to be a thematical analysis approach. This approach is described by Braun and Clarke (2006) through six different steps which then were used as guidelines for this study. Though adaptions were made to better fit the report.

The following part will be dedicated to explaining how we used the 6-steps of the thematic approach by Braun and Clarke (2006) as guidelines to properly evaluate and analyze our data.

Step 1 - Familiarize yourself with the data. Both researchers were present throughout all interviews and from these, a transcript was created. This was thoroughly read and corrected with the help of audio recordings from each interview. This to make sure nothing was left out.

Step 2 – Generating initial codes. The researchers did not use coding to divide the data into groups, as mentioned in this step by Braun and Clarke (2006), but rather organized the data manually. Which was possible due to the scale of the study.

Step 3 – Searching for themes. The data was reviewed and in combination with the information gathered in the theory section, the researcher was able to divide the analysis into five main areas. Though within these some sub-clauses was deemed to be appropriate.

Step 4 – Reviewing the themes. Once the five areas had been appointed, the transcripts of each interview were once again checked through and the different statements were moved into a new document created for each main area. Making sure no excessive information was left behind once all the data applicable to each area had been moved.

Step 5 – Defining and naming themes. The researchers concluded that there should be five different main areas: TradeLens, Blockchain, Visibility, Documentation & information handling, and Security. Within these a few sub-clauses were created.

Step 6 - Producing the report. By diving into each main area one at a time, the data gathered through each respondents' interviews were put together and compared. Not only with the other respondents' statements and data, but with the gathered theoretical approach gathered in the theory section. Making it an analysis of both theoretical and practical data in order to answer the research questions of this report.

4. RESULTS

The result of this study will be divided into five main areas to which the data from the interviews will be presented and interpreted together with the theory section.

Table 1 represents the respondent's self-considered knowledge of blockchain and TradeLens prior to participating in the interviews. The respondents were asked on a scale of 1 – 5 of how knowledgeable they considered themselves on each subject, 1 being the least, and 5 the most. This was to attain a reference level throughout the interviews.

Table 1

Respondents estimated self-considered knowledge of BCT and TradeLens.

Identification	Blockchain knowledge (1 - 5)	TradeLens knowledge (1 - 5)
Respondent B1	1	1
Respondent B2	3	3
Respondent B3	2	1
Respondent F1	3	3
Respondent F2	1	2
Respondent F3	2	1

According to Table 1, all respondents were towards the lower end of the scale both on BCT and TradeLens (between 1-3). The respondents considering themselves more knowledgeable on BCT also seemed to consider themselves more knowledgeable on TradeLens. The prior knowledge of the respondents on these subjects did not seem to be determined by the type of company the respondents work within. This means that there is no direct difference between the FF: s and BCO: s self-considered knowledge.

4.1 Respondents understanding of TradeLens

The prior knowledge of TradeLens among two of the respondents were nonexistent, whilst others had some fundamental knowledge and experience of its services. Though this did not seem to depend on their company type. They were asked to describe its essence in a simple manor, which the two respondents without knowledge of it were unable to do. The remaining respondents' answers variated but also had some common grounds such as visibility and connecting actors. It was described as an "integration engine", "digital platform for connecting different actors", "portal for customers and commodity owners to make bookings with visibility" and "possibility to add and access documentation and visibility". These are not exactly contradictory of each other, but they are at the same time variating their focus on different parts. This was even clearer the further each interview progressed. The BCO respondents tended to refer to connecting actors and information flow more than the freight forwarders. Although the freight forwarders seemed to have more focus towards the system integration such as bookings, they still mentioned visibility and connecting actors.

A minority of the respondents further elaborated their opinions of TradeLens. F2 mentioned that they could not see what value TradeLens created for their company and that it would only cost them money at this state. F3 thought that they got too much information out of TradeLens and that it took too long to go through all the information. They then explained that "There is also the function of taking your own actions, but we as customers do not want to take any actions, we want them to solve it for us".

4.2 Respondents understanding of Blockchain

The respondents were also asked to provide a simplified description of how blockchain works and just as in TradeLens example, two were unable to provide an answer. Remaining respondents' descriptions seemed to mostly think of blockchain in relation to supply chain. BCT was also described as something similar to TradeLens by one of the respondents.

A common interpretation from both types of respondents were that BCT spurs information sharing between different actors. Another aspect brought up that was not defined by the respondents' company type was the mentions of how blockchain can help the security aspect of information sharing. Respondents B1 and F2 seemed to have a somewhat deeper understanding of BCT than the rest, even though they put themselves low on the scale in the previous figure. They both mentioned its connection to Bitcoin and that it was a mere technology and not something one could use as a system. F2 also touched upon specific actors being able to access specific information even though they are within the same network. Though respondent F3 which did not provide a description of blockchain, provided a different approach to the subject. This with the quote "I don't believe we as intended users are interested in blockchain or similar technologies, we just want to know what it could give us and how we can apply it".

4.3 Visibility

The visibility questions that were asked focused on what information they believed their company lacked and where in the supply-chain they deemed visibility to be most valuable.

B2, F2 and F3 thought that they got the most value of having visibility of the cargo before it was loaded onto the ship, as well as knowing when the ships leave the port. F1 explained that the need for visibility on different parts of the transport tends to change depending on what type of incoterms is used. Thought for them, it seemed more important to have visibility on the last part of the transportation, since they themselves had full control of the cargo until it is loaded on to the ship. B1 similarly stated that they valued visibility on whichever part of the transport they were not in control of.

When it came to what information regarding visibility that the companies possibly lacked, the answers varied between the respondents. B3, F1 and F2 thought that their companies lacked information about the *estimated time arrival* (ETA), and more specifically what caused the change in ETA. Or rather that they did not attain this information fast enough.

The remaining respondents were more system oriented. B1, B2 and F1 said that the visibility information that they gather comes from different sources/systems and having it on a single platform would smoothen the process.

B3 also mentioned that they have a hard time getting all their visibility information in a format that is easily applicable to their systems. Another thing that B1 touched upon is the process of manually attaining the information in the first place by having to search through different transportation systems about the goods status and locations.

There seems to be some variation when it comes to the respondents' focus regarding visibility. The FF: s mainly thought visibility of the cargo being loaded onto the ships created more value. F1 explained that once the goods arrive at their agreed destination for the transport, the FF is no longer in need of any visibility or information on the transport. This is because their part of the contract is complete. Meanwhile the BCO: s had varied opinions about where it was most important, and the response “during the entire transport” was given by two BCO respondents. When it came to what information they seemed to lack, their opinions tended to differ.

The FF: s main concern seemed to revolve around information regarding ETA. The BCO: s on the other hand seemed to have an issue with the number of different sources that provided them with visibility information. An important note is that even though the companies focused on different areas, they still touched upon each other's areas.

4.4 Documentation and information

Documentation handling and information sharing were also touched upon during the interviews, both about the respondent’s opinion of their current way of handling documents and information. As well as their thoughts on possible future developments.

Among the six interviewed respondents, five of them expressed that their documentation handling is mostly done manually. Though other parts of their business may be system based or digitally developed, like bookings and order handling for example. Mail and phone conversations also seemed to be a common way of exchanging information daily among the respondents’ companies. F1 expressed that a lot of technology on the market is still stuck in the 70-80-ties and that the development and ease of attaining information is easier within other transportation modes.

The FF: s stated that their documentation handling could vary depending on which of their customers they were dealing with, since many of them had their own setup. All three of the FF: s use ordinary BL: s and F1 stated that they do not see any “real issues” with their current practice. F3 only uses e-BL with specific suppliers but stated that they believe e-BL is how you are supposed to work all around since it removes paperwork. Though just as some suppliers utilizes e-BL, other does not, which currently makes it impossible to fully digitalize their documentation handling. Respondent F3 stated that they have a negative view of manual documentation handling.

Respondents from the BCO: s as previously mentioned also works mostly manually with their documentation handling, although all of them seemed to look into digital developments.

B1 Stated that “The manual way takes too much unnecessary time and doesn´t create any value”.

Just as the FF: s, the BCO: s had to adjust their documentation handling depending on who they are dealing with, this also includes governmental authorities as mentioned by B2. Some authorities within the Swedish market, such as customs and Livsmedelverket seems to demand that the documentation arrives to them in a specific form, which are halting their digital development. B2 continuous this statement with explaining that this means that it doesn’t matter how much one digitalizes one part of the chain. Since eventually, someone will demand the documentation in its original paper form on the other side of it. Important to note is that this does not apply for all transports. B2 also brought up a different reason for digitalization being haltered, the human factor. Though some people are all for becoming more digital, there will most likely be some that are not. There are people who still prints papers even though they don’t need to since that’s how they have always done it, it’s a form of human resistance B2 says.

Respondent B3 explains that they also have different ways of handling documents as well as different systems. There is a reason behind it, though having it less scattered and more similar systems to one another could favor the company in general.

On the other hand, when outsourcing, B2 explained that they received everything digitally but by doing this they lose their direct control of the goods and transport in exchange. They then work with copies of the documents and archives the original documents once they arrive. They explained that this works better for different transports and areas then others. Using copies seemed to be a common thing for both B2 and B3.

Utilizing the waybill and e-waybill concept allows them to use copies, this means they don’t have to print the original documents to pick up the delivered goods B3 says. This is the main way of working for them, but just as previously touched upon, they also deal with actors who do not accept or work with this type of documentation handling.

B3 explains their benefits of using waybill or e-waybill instead of BL is that “It is easy for each party to use, as soon as the goods arrive, we can pick them up and take them through the customs”. B3 also continued this statement with explaining how advantageous this has been during the pandemic when so many people have been working from home. B1 on the other hand does not use e-BL nor waybills but states that they indeed can create a big advantage and save time for the users. B2 explains that they can work digitally with documentation copies in a similar manor by outsourcing some of their shipments.

4.5 Security

Becoming more digitally developed or using different methods for documentation handling can clearly create different values according to the respondents, though in doing so they might expose themselves to a security risk. The respondents were asked about their opinions and thoughts on how these things affect their security.

Most respondents expressed how this development could increase the security risk, though few expressed an actual concern for it. An example brought up by B2 and F2 was the risk that comes from spam mails and messages, which seemed to be common in their organizations. Respondent B3 on the other hand mentioned that their company had a previous encounter with a cyber-attack, which resulted in a change of their infrastructure and how they work with security. Another aspect brought up by F1 was the risk of using waybill, they expressed that it provides less security than a BL/e-BL.

All the respondents expressed that the digitalization transformation is still worth it even though it comes with a risk. To summarize B3s statements, “It feels like there is a bigger risk not to develop and be more digitalized, it feels like our customers are waiting for us to do so”. Though most of the respondents did not express a security concern, some were more prepared for digitalization than others. For example, B1 mentioned that their company has a dedicated group of employees that handles security measures. The respondents' opinions seemed unaffected by the origin of their companies in this matter.

5. DISCUSSION

5.1 BSP

One of the reasons why Blockchain have struggled with definitions as mentioned by S. Seebacher and R. Schüritz, (2017) may be due to many different application areas. Authors from different sectors and markets may interpretate and emphasizes it differently depending on where they have their own footing. This could be seen through the respondents' answers as they tended to use the word "information" instead of, for example, "transaction" when describing the essence of blockchain. Thought they all seemed more supply chain focused, their explanations of it still slightly varied. However, it did not seem to be company type related, which seems reasonable since they are acting within the same field.

Blockchain does not seem to be the only part that is struggling with its definition. TradeLens has been described by IBM (2018) as a "blockchain enabled shipping solution", while TradeLens (2022) refers to themselves as "an open and neutral supply chain platform underpinned by blockchain".

These can be seen as vague descriptions, especially the "shipping solution" and "supply chain platform" parts. Which in theory could be a solution or platform for anything within the shipping and supply chain industry. Leaving the intended users with an ocean of possible interpretations and room for misunderstandings. This was especially clear in the interviews with respondents who tended to have a lower understanding of the subject prior to the conduction of the interviews.

This is also applicable for the "blockchain enabling" description. As previously mentioned, the word "blockchain" seems to be a commonly uttered word in a variety of markets, including logistics. For IBM and TradeLens, these descriptions might be seen as sufficient to describe the concepts essence. Though not being able to present a simple and decisive explanation might be one of the reasons to why the respondents had such a variety of interpretations. Some, even unable to present an explanation of either TradeLens or blockchain at all. That being said, this type of platform is not a simple physical product made as a solution to solve a single distinct issue, so having a decisive description might be easier said than done. Technically, the current description of TradeLens does indeed cover each of the BSP covered areas, but what does it actually tell the intended users? Therefore, having a few simple descriptions within each field of the BSP operations might be a more reasonable solution. For example, one for the visibility aspect, one for connecting actors and so on.

Though an interesting point as a respondent pointed out regarding blockchain enabling solutions is the quote "I don't believe that we as intended users are interested in blockchain, we just want to know what it could give us and how we can apply it". On one side, being able to understand how blockchain works, with its technical and architectural aspects, as mentioned in the theory section. Might not be of any direct value for the possible users. Though on the other side, how are the intended users supposed to know what it can provide for them, if there is no understanding of what it is? Taking this into consideration, a fundamental knowledge may be required for the intended users to be able to properly evaluate the possible value it could create.

For example, being able to tell a BSP and blockchain itself apart and to understand their correlation. As well as understanding that there are different types of blockchain that can be applied in different ways within a network. F2 mentioned that only specific actors can access specific information and documentation within a network. Which is indeed the case in a private permissioned blockchain as in TradeLens, but not in every blockchain enabled solution.

Regarding the respondents understanding of TradeLens, those able to provide an explanation did provide somewhat similar ones, though with a slight emphasis variation. As mentioned in the result, the BCO respondents tended to refer to connecting actors and information flow more than the FF: s. A reason for this can be connected to liability of the goods. Let's say an FF signs a contract for goods transportation to a certain port. They are only liable for the goods until it reaches said destination of their contract (depends on incoterms). From that point forward they are in no need of information and visibility of the goods since it is no longer "their concern". This was pointed out by respondent F1 when speaking of visibility needs. The BCO on the other hand will, since it's their goods, need to keep the information flow going during the entirety of the transportation, which was emphasized by two out of the three BCO respondents. There may also be times when a BCO uses multiple actors for a single transportation of goods, which leads them to the need of connecting actors. Although the freight forwarders seemed to have more focus towards the system integration such as bookings, it's important to note that they did mention the connecting actors and information flow as well.

A figure of respondents self-considered knowledge of BCT and TradeLens were conducted prior to the interviews to attain a reference level. This report has mentioned the need for fundamental knowledge of the subject among the respondents for the purpose of attaining more valuable data. This being said, the figure showed an average of 2 for blockchain and slightly less than 2 for TradeLens which demonstrates a self-considered lack of knowledge for the subjects. Worth mentioning on the other hand is that some of the respondents that deemed their knowledge to be on the lower side, were able to provide a more accurate descriptions than others who placed themselves higher.

None the less, these are all individuals who can be seen as intended users for a BSP: s which is why this data can be seen as valuable for the study. This also goes to prove that TradeLens and BCT can be seen as fairly complex, even for its intended market and users. Which means that either the current general market knowledge is to low, or possibly, the marketing and explanations is to complex. Maybe even a combination of both. Though blockchain was introduced in 2008 (Nakamoto, 2008) and TradeLens was brought into the Scandinavian market in 2020 (Anonymous personal communication with manager at Maersk, 2022). It seems fair to say that it will take some time for the market to grow more accustomed to the concept.

As previously established, most of the documentation handling is still done manually on the market. Going from manual documentation handling to a BSP can be seen as quite a big step in the market's digital development. The market might lack knowledge because of how behind they are in their digital development. This is not limited to the intended users, just as previously established, governmental authorities such as customs seems to be just as behind in their development. Which can be seen through the respondents' statements of authorities and customs needing documents in their original paper form during transports. So, even if actors want to adopt a BSP, if the market is struggling with their transformation to being

digital, a BSP might be too complex for the current market to handle. Important to note is that this is a pure generalization and that knowledgeable and digitalized actors do exist.

So why is the market so far behind in their development? Respondent F1 stated that acquiring information is currently easier for other transportation modes than shipping. Considering F3: s statement "we as customers do not want to take any actions, we want them to solve it for us". There seems to exist some form of complacency where the actors do not want to bother with learning or developing internally. Since just as B2 mentions, by outsourcing they can get the documentation handling more digital.

During this study, a lot of focus has been on the market and its intended users for BSP adaptation. This section will focus a bit more on the BSP development and its suppliers. Gasser (2019) mentions in his case study that it seems that a DLT such as TradeLens is still in its development phase, which could provide problems for its users. This aligns to some extent with F2 and F3: s mentions that there are some problems with TradeLens and that they have a hard time seeing what value it creates. Although Gasser proceeds to explain that the technology is constantly evolving and that the companies would miss out on even more if they decided not to join the DLT solution. Which can be compared to B3: s statement on there being a bigger risk not to develop and be more digitalized. Though digital development does not need to be through a BSP.

To summarize this, the entire market might not be completely ready for a BSP, but there are no guarantees of the BSP being completely ready for the entire market either. If there are some compatibility issues or misinterpretations between the intended users and the providers, who are to decide which part is lacking? On one hand, if all the intended users can't understand or utilize the product that is being provided, is it truly complete? And on the other hand, if some are able to understand and utilize it, why can't they all? It seems as if both parts needs time and further developments.

5.2 Information and documentation handling

5 out of 6 respondents mentioned that their companies mostly handle documents manually. A common reason for this seemed to be because of other actors and not because they themselves did not want to, at least according to their own statements. Whether that is true or just an excuse is hard to prove, but in this case, it seemed like it was true to some extent. These other actors could for example be suppliers or customers that does not have the ability or knowledge to become more digitalized. Another factor which according to the respondents' forces companies to staying manual are the Swedish governmental authorities. Such as customs and Livsmedelsverket that demands documentation in a specific form, which halters the digital evolution of the companies.

Although respondent F1 did not seem to have any "real issues" with their current manual practice, the rest of the respondents said that they are actively looking into options for digital development. To quote B1 "The manual way takes too much unnecessary time and doesn´t create any value", which seemed to be the majority of the respondent's opinion.

The respondents were asked a about e-BL and what their opinions of it. All the respondents seemed to have knowledge regarding e-BL and had a positive view of it. Although there were only one of the respondents' companies that actually used it in their everyday work. The rest of seemed to mostly rely on waybills or just the regular BL. The reason for this is as mentioned above, that there may be external actors that hinders the development.

5.3 Visibility

There was a variation in the respondents of FF: s and BCO: s opinions of visibility. The FF: s tended to think visibility created the most value during the loading of the cargo onto the ship. This is most likely due to their responsibility of the cargo which often ends when it arrives at the arranged transportation company. The BCO: s on the other hand had varied responses on this subject. The reason for this could be that they use different transportation companies with different incoterms and is not in direct control of the goods.

There was also a difference in opinions regarding what their companies lacked in visibility. The FF: s was focused on the visibility around ETA and more specifically what caused the change. The reason for this could be that freight forwarders, as previously mentioned, works like a mediator and needs to keep their customers satisfied. They can potentially make them more content by providing accurate and explanatory information about why the ETA changed and not only that it changed. From the BCO: s perspective, it was more focus on the spread of information that they must gather to attain a complete picture of the situation. Why this is a problem probably comes from the use of different suppliers and transportation companies. They presumably have different systems and ways to gather data, which makes it harder for the BCO: s to integrate into their own system.

The respondents' answers about visibility goes in hand with what bartlett et al (2007) says in his study. They mention that by improving visibility it leads to faster and more accurate deliveries of information, which is ultimately what both the FF: s and BCO: s says they want to improve within their companies.

Comparing the case study examples mentioned in the theory with the answers from the respondents, you can make out some clear similarities. Both the real case by Rukanova et al (2021) and the hypothetical case by Gasser (2019) mentions that the most important aspect in a platform such as TradeLens is the visibility and transparency aspects. These aspects are mentioned to lead to better efficiency when they are utilized properly. Their conclusions are similar to the respondent's opinion.

5.4 Security

When it came to the digital transformation and the security risks concerning it, there weren´t really any concerns among the respondents. Perhaps because most of them haven´t been affected by any form of significant cyber-attacks, or that they believe their security is strong enough. Although there was a clear differentiation between the different companies'

preparation for digitalization. This most likely depends on how digital they currently are, the size of the companies, and if they can afford to focus on security. Gasser (2019) mentions the importance of the security aspect within blockchain. Which was mentioned by the majority of the respondents when explaining blockchains essence. Although they seemed to recognize blockchains security aspects, no one seemed to think of it as an important addition to their own company.

5.5 Method discussion

Interviews were conducted since the study needed elaborative answers on a rather complex subject, though this meant the study would be utilizing a smaller sample size. 12 individuals were approached regarding their participation, of which 6 agreed. Having only 6 respondents does bring a risk of decreasing the study's reliability. Though having fewer respondents gave the opportunity of applying a more in-depth approach for the interviews. It also increases the risk of the observations being outliers. So, a larger sample would have been preferable for increased reliability of the study. Reliability which is described by Josefsson (2006) as the dependability of the data. Meaning that a minimal risk of variations or random errors are to strive for when collecting data.

The researchers also decided that one-on-one based interviews would be the best use of method since it would increase honesty and credibility of the respondent's statements. Due to the study touching upon sensitive subjects regarding the respondent's respective companies' interests. Though a group interview could have spurred valuable discussions for the report.

This study only investigates the understanding and valuation among BCO and FF: s, though intended users of a BSP could be any actor from the supply chain. Which means the result should not blindly be conveyed onto other types of companies without further investigation. Though it can be used as a reference level. This was also a study on companies with their core operation in Sweden even though a BSP could be applied all over the world. Although since this was the case, interviewing individuals working within the Swedish supply chain market provides validity in the data collection. Validity is about assuring that the things measured are related to what the researchers wanted to investigate. (A. S. Josefsson, 2006)

The questions used in the interviews was reformulated, changed, and developed the further the process went. There were multiple reasons for this, some questions provided inadequate and too simple of an answer and some questions were misinterpreted. Though most questions were added since the researchers found previously uncovered areas within prior interviews, in other words a lack of validity. To further avoid a lack of validity, the interviews were conducted in a semi-structured manner as the subject was deemed rather complex, and elaborative answers was needed.

It was deemed necessary to send out a document to the respondents with keywords that would be touched upon during the interviews. Though by not attaining the exact interview questions, the authors expected more genuine and credible answers from the individuals. Along with the keywords the respondents received an informed consent, which they then signed. It stated that they were allowed to withdraw any or all statements until publication

and that they would be anonymous. This was to attain a more open and non-restrictive interview with increased reliability by protecting their personal interests.

Lastly, as previously mentioned the respondents' employments originated from either purchasers or logistic operators. Since these individuals are usually part of the decision-making process of acquiring a BSP and in daily contact with the supply chain, their opinions were deemed valuable for the study. The average experience of the respondents were about 12 years, and more experience equals higher reliability of the gathered data. Though an important note is that these individuals' opinions should not, without further investigation, be seen as a complete reflection of their entire companies. Due to the researchers lack of resources, the result should not blindly be conveyed to the entire supply chain market, although it should suffice as reference level.

6. CONCLUSION

The aim of this study was to elaborate the correlation of BCT and a BSP such as TradeLens. As well as investigating the Swedish markets intended users understanding and valuation in such a concept.

RQ 1: How is TradeLens correlated to BCT?

As the definitions by IBM and TradeLens implies, TradeLens is a blockchain "enabled" platform or solution. Blockchain has been defined as a springboard for further development, meaning, TradeLens uses blockchain technology as the foundation to which the platform has been built upon. The technology brings information sharing possibilities with the help of the security that comes from its construction. While the platform connects the actors to a network consisting of parts of the supply chains ecosystem.

RQ 2: How does the understanding of a BSP look at a BCO compared to an FF?

The respondents did have some variated understanding of a BSP, although this did not seem to be company specific. This is most likely due to the fact that they both operate within the same industry. This study did however conclude that the general knowledge of a BSP among the intended users is far too low for them to properly understand what it offers. Which also seemed to be self-understood by the respondents through their low self-determined knowledge of the subject. This includes the knowledge and understanding of the platform as well as the blockchain technology behind it. Though full understanding of blockchain, its architectural- and technical aspects might not be of relevance for the users. Though a fundamental knowledge is deemed necessary for them to be able to grasp its value. For the users to be able to better understand a BSP, the providers of it might need to rethink how they describe and present it.

RQ 3: How does the valuation of a BSP look at a BCO compared to an FF?

The valuation of a BSP among BCO and FF: s was difficult to properly evaluate due to the fact of the low knowledge and variated interpretations. Though a few conclusions could be made within BSP covered areas. Important to note is that there were no pure one-sided values brought up by the different types of respondents, but what they empathized sometimes varied. As in the visibility aspect, the FF: s seemed more focused on the visibility information surrounding the ETA. While BCO: s wanted to congregate their sources of information. When it came to the BSP: s other areas, such as security, digitalization and documentation handling, the respondent's valuation did not seem to differ. For example, when it came to digital development, most of the respondents admitted that there were risks involved. Though few expressed an actual concern for it.

There were indications of compatibility issues between the product and its market revolving usage, application and understanding of each other. It was concluded that the actors within the supply chain needs to further develop their digitalization in order to comprehend and

utilize a BSP as intended. Though since the intended users are currently not able to adopt and apply it, is the product truly enough developed?

6.1 Recommendations for future research

This research could be expended towards other actors within the supply chain since intended users of a BSP, as previously mentioned, are the entire supply chain. Just as it could also be expanded by looking into different types of decisionmakers besides logistic operators and purchasers to gain additional perspectives. Investigating the understanding and valuation among actors outside of Sweden could also be of relevance, especially countries with a more TradeLens adopted market.

It could also be worth investigating other similar platforms where TradeLens is not used as the main example. Comparing the difference of utilizing a blockchain enabled platform compared to a none-blockchain enabled one could be highly relevant for the market.

Another aspect that could be recommended for future research is to further investigate why the market is so behind in their digital development and why this differs between transportation modes.

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Appendix

Informative paper for respondents (Appendix 1)

We humbly thank you for agreeing to participate in this study, here comes a short document of information that you need to read before the interview takes place.

This study is conducted by Jesper and Felix as part of our bachelor thesis in International Logistics at Chalmers University of Technology in collaboration with Maersk.

The purpose of the study is to define and simplify the correlation between TradeLens and Blockchain and to find possible change of valuation among decisionmakers in a supply chain platform such as TradeLens. We are looking into beneficial cargo owners and freight forwarders in the Swedish market and comparing different types of decisionmakers, such as operators and purchasers.

We will not share the exact questions of the interview, but you will be able to see some intended subjects below. Note that this is a semi-structured and “one-on-one" based interview were both Jesper and Felix will attend. The subjects are as followed:

Blockchain, TradeLens, API, eBL, document and information handling.

Looking forward to the interview, thanks again for agreeing to participate.

Best Regards

Jesper Rosenberg & Felix Andersson

Letter of consent for respondents (Appendix, 2)

Read this form carefully, if you have any questions regarding the research or this form, please contact the researchers with the contact information displayed in a later section.

This study is conducted as part of a bachelor thesis at Chalmers University for International Logistics by Felix Andersson and Jesper Rosenberg in collaboration with Maersk.

The interviews will be conducted in a "one-on-one" manner, in your preferred language (either Swedish or English). The interviews will be either online or in person, but preferably in person if possible.

Study Title:

Possible valuation in TradeLens

Purpose:

Investigate and highlight what intended users such as beneficial cargo owners and freight forwarders value and lack in the TradeLens concept. Not entire companies, but what attracts the individual hands-on employee when making decisions for the company. More specifically, employed operators and purchasers.

Sampling of Respondents:

The sampling has been conducted by Maersk and the respondents was chosen based on their prior contacts with Maersk as well as their fundamental knowledge of the subject.

Confidentiality:

The researchers have decided to keep your identity confidential to the extent provided by law. The respondent's responses will be used as data for the study, and they will be displayed as "by *respondent x*". Once the study is finished, any list of names and contact information will be deleted, assuring full confidentiality. Note that Maersk will NOT have special access to any lists or data on identities of each "respondents x" nor who states what.

Right to withdraw:

The respondents have the right to withdraw their informed consent, as well as their response at any time until the study has been published. This is done by contacting the researchers.

Agreement:

By signing this informed consent, the respondent hereby ensures that they understand that:

- Participating is optional
- This paper is written in collaboration with Maersk
- They have given their consent to be part of this research
- Their interview and choice of words can be used as data for the research
- They will be fully anonymous
- They have the right to refrain from answering a question and/or to withdraw their consent up until publication
- The respondent audio will be recorded during the interview
- The interviews proceeding and agenda will be decided by the researchers
- The research will be published

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Respondent's signature: **Date:**

_____ _____

Researchers Signature: **Date:**

_____ _____

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