Haaga-Helia
University of Applied Sciences

Utilizing Blockchain to Digitalize Bill of Lading Process at Company X

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Bachelor's Thesis
Degree Programme in International Business
2020

Haaga-Helia
University of Applied Sciences

Abstract

Date

Author(s)
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Degree programme
International Business

Report/thesis title	**Number of pages and appendix pages**
Utilizing Blockchain to Digitalize Bill of Lading Process at Company X	**59 + 3**

This product-based thesis was conducted to propose a solution for the Bill of Lading digitalization that would solve the major obstacles of the paper document and improve the case's company business. The commissioning company is an international ocean carrier for heavy lift and cargo project. The company has been experiencing disadvantages with paper documentation. The objectives were to introduce the blockchain-based application as a solution for a paper-based Bill of Lading, to develop an adoption process including a pilot project plan and a suggested digital platform after a selection process, and a flow chart of the electronic document.

The project management methods were desk research and qualitative research. The desk research supported writing the theoretical framework. Qualitative research was the method to gain knowledge and data used to analyze the needs of the electronic Bill of Lading and to identify suitable criteria for provider selection.

The theoretical framework focused on the functions and characteristics of a Bill of Lading, the blockchain concept with its properties, and the provider selection process. The theoretical part includes academic definitions and explanations which supported building adoption and digital document processes.

The empirical part was about a process that the commissioning company could follow to adopt a blockchain-based platform for transferring documents easily with a pilot project plan. It was also about an electronic Bill of Lading flow chart presenting the connections between the involved parties, and a process to work with a digital Bill of Lading.

In the final chapter, the content covered the key findings acquired from project task including the theoretical framework summary, the demand of e-B/L, the pilot project plan with document flow, and recommendations for further developments with blockchain regarding the enhancement of payment transaction and the implementation of ROI evaluation. Company feedback was recorded after thesis outcomes were presented. Finally, a reflection on the author’s own learning ended the thesis.

Keywords
Blockchain, Bill of Lading, process, document flow, web app, supplier selection.

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1 Introduction

This report is a bachelor's thesis for the International Business Bachelor program of Haaga – Helia University of Applied Sciences.

In the beginning, the first chapter was written to provide an overview of the commissioning company. Following, the thesis idea would be described briefly, included project objectives, project tasks, and project scope. Finally, international aspects, stake-holder benefits, and project risks were explained as well.

1.1 Background

According to Professor Grant, “business logistics permeates almost all aspects of our daily lives and without it we would not have many of the goods, products and services that we take for granted in our normal existence.” (Grant 2012, 1). Moreover, the logistics of the 21st century, which is the philosophy of flow management was considered as an essential part of industrial business and service management. The costs of logistics activities were believed to account for 40% – 60% of the total cost of products and services (Kacmary & Fedorko 2014, v). Relied on technology development and innovation, people are heading to digitalize economic for optimal management and efficiency. Hence, tracking or equal responsibility of data is the highlight in business management nowadays.

For the last decade, the term “blockchain" has been mentioned widely, especially in financial technology topics. Besides, it was confirmed that blockchain could be applied in more other fields. With the characteristics of transparency, decentralization, and security, blockchain has made an impression to the logistics and supply chain professionals, especially procurement and shipping ones. It was stated in Dynamics in Logistics:

> "Blockchain facilities the possibility to cut costs and advance global trade as transaction costs reduce. The reason why blockchain is so decisive is that it has the potential to redefine the way digital information is exchanged, thanks to immutability which is absent in other information technology systems. Therefore, maritime stakeholders should understand that a blockchain-based system will lead to considerable operational improvements and cost savings."
> (Freitag, Kotzab & Pannek 2018, 197).

There are many successful pilots in applying blockchain into Logistics and Supply Chain such as Maersk, Walmart, and CMA CGM. According to Maersk news, TradeLens – a result of the collaboration between Maersk and IBM, is “a blockchain-enabled shipping solution designed to promote more efficient and secure global trade, bringing together various parties to support information sharing and transparency, and spur industry-wide innovation." (Maersk August 2018). By using TradeLens, the transit time of a shipment of

packaging materials to a production line in the United States can be reduced by 40% and saves thousands of dollars in cost (Maersk 2018.).

Before investigating the project topic, the author would like to briefly introduce the commissioning company. The company was named SAL Heavy Lift GmbH having headquarter located in Hamburg, Germany. SAL Heavy Lift has been known as a world-leading carrier specialized in sea transport of heavy lift and project cargo. The writer worked as a summer trainee since June 2019 at the Helsinki agent. Then, she has been a part-time assistant since October 2019. The main tasks were handling documents such as Bill of Lading (B/L) and Shipment Notice, supporting calculating freight indications, and assisting Sale and Operations manager. While working in the logistics field, especially in the shipping company, she noticed the time-consuming document processes, specifically, the Bill of Lading (B/L) was not so transparent and efficient. This has caused inconvenience and poor outcomes. In meanwhile, blockchain is known as a powerful tool to support data management with high security and transparency in the near future. And electronic Bill of Lading (B/L) definition has been a new trend in the Logistics industry recently. The author decided to develop the thesis topic as “Utilizing Blockchain to Digitalize Bill of Lading Process” to solve the mentioned obstacles for SAL Heavy Lift as a case company.

Even though the writer was not so familiar with logistics and blockchain, she still had the opinion that it is time to taking advantage of technology development to digitalize logistics or supply chain. This would be the next five-year trend and affect strongly how people manage moving goods.

1.2 Project Objective and Tasks

The project objective is a proposal of a pilot project shipment using a blockchain-based electronic Bill of Lading, and the concrete outcome is a blockchain-based electronic Bill of Lading process for commissioning company. The thesis writer was not a student from the Technology program, but International Business with the major in Supply Chain Management. Thus, this thesis would provide primary knowledge of the blockchain.

The thesis project is divided into 5 project tasks (PT) as below:

PT 1: Designing a theoretical framework for the project.
PT 2: Defining the needs of the electronic Bill of Lading based on the company background and interviewing suitable material case – G2 Ocean.
PT 3: Developing blockchain-based electronic Bill of Lading website application process for commissioning company.

PT 4: Building electronic Bill of Lading process

PT 5: Presenting, collecting feedback and evaluating the project.

Table 1 below presents the theoretical framework, project management methods, outcomes, and thesis chapters for each project task.

Table 1. Overlay Matrix

Project task	Theoretical Framework	Project Management Methods	Outcome
PT 1	Fundamental blockchain theories, shipping documentation processes, supplier selection process	Literature review	Theoretical framework
PT 2	Blockchain key properties and applications, Bill of Lading process, functions and legal issues, electronic Bill of Lading key features and advantages.	Qualitative data collection through interviews and researches	Identifying problems of traditional Bill of Lading process and ideas of electronic Bill of Lading website application with list of platform providers
PT 3	Website application, Blockchain-based website application, supplier selection process	Qualitative data analysis	Building electronic Bill of Lading adoption process and a proposal of potential platform provider
PT 4	Electronic Bill of Lading website application, Bill of Lading process, supplier selection process	Electronic Bill of Lading flow explanation	Building electronic Bill of lading flow with suggested platform
PT 5	Reflection on the previous theories	Receiving company feedbacks reflection on the project objective	Project evaluation and finalization.

1.3 Project Scope

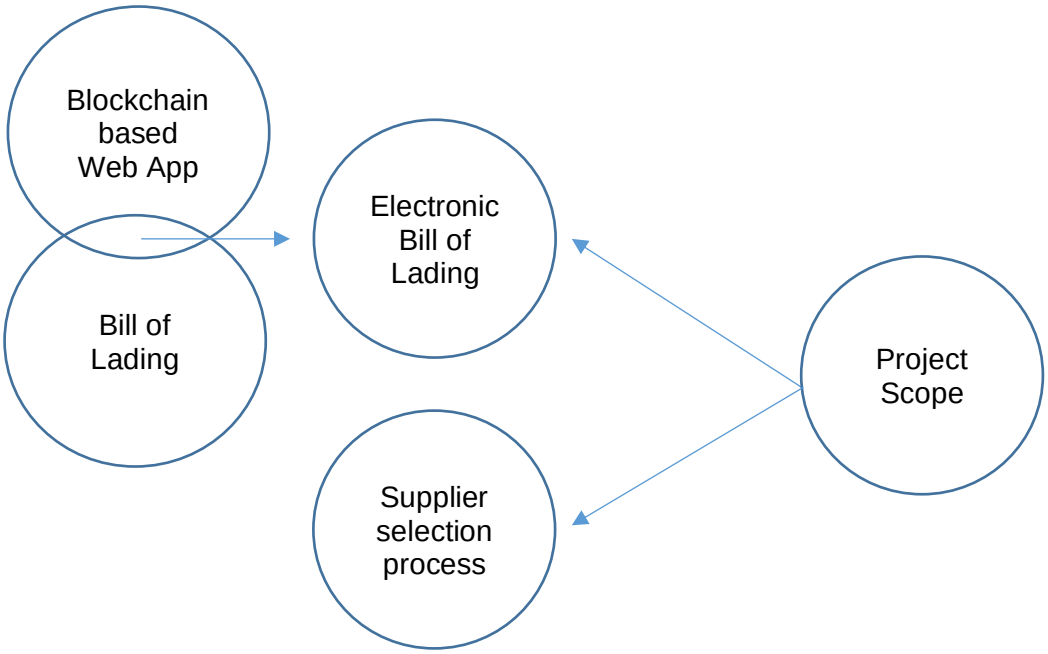

Figure 1. Project Scope

Firstly, due to its functions and process, the Bill of Lading (B/L) would be mainly explained through the thesis and applied with blockchain to create the electronic Bill of Lading concept. Qualitative research could be done to gather data and ideas to obtain the thesis objectives.

Secondly, blockchain, IoT, or machine learning are the most trendy and useful technology all over the world to reduce manual work by automatic and digitalize processes for management improvement. Companies, not only technology ones, have been investing resources to keep business being updated. For the electronic Bill of Lading, the blockchain-based platform has been the latest solution.

Finally, the website application is not a new idea to be a tool for utilizing technology to support the business. And it could be the best way to implement the idea of the digitalization of the document process, in this case, is Bill of Lading (B/L). There are some providers with the blockchain-based platform for the digital document, hence the supplier selection process should be executed to choose the most suitable platform for the case company.

1.4 International Aspect

As mentioned earlier, the commissioning company is located in the Hamburg city of German. This is an international shipping company with a B2B business model, including offices in 9 countries and agents in over 20 countries. The main activity of the company is providing transport of heavy lift and project cargo, which supports the global trade of energy projects or manufacturing.

The Bill of Lading (B/L), which is recognized as a contract of shipping, plays an important role and be a compulsory document for any kind of shipment. Electronic Bill of Lading would bring a huge impact on global shipping or logistics compared to the traditional one in the near future.

1.5 Benefits of Stakeholders

An electronic document adoption process with a pilot project plan and a document flow were defined as outcomes. This would bring the new view of using technology – blockchain to overcome difficulties and risks caused by the traditional Bill of Lading (B/L). Besides, as the electronic Bill of Lading could replace the paper document in the future due to fast development and digitalization trend, thesis outcomes would help the commissioning company be updated in time with a new method of trading.

For the Supply Chain Management students, this thesis might be material for those who want to know more about technology and Logistics / Shipping combination. This also inspires Supply Chain colleges to apply blockchain into Supply Chain such as Procurement or Warehouse Management. Moreover, it can be a dedication for the school thesis database.

Personally, this thesis was the writer's approach to join the professional community in Logistics and Supply Chain. It supported to resume knowledge and experience, to define the career path and to inspire the writer to keep her motivations. Having primary learning about new technology would be an advantage in the market nowadays while the world is getting digital. Lastly, the thesis would provide a chance to look deeper theoretically into topics related to the study program.

1.6 Project Risks

As it has been described until now, the thesis seemed like a cross-program thesis of BBA and IT. Hence, the writer ought to be careful and design structure properly to have the right approach while conducting the thesis. The content must focus on the logistics documentation process and using blockchain was an idea of the solution. No further

details of how to build a website application or technology-related topics should be included such as coding.

The theories about blockchain and website application were included in the report, which would take the author a lot of time to study and research, especially blockchain. Since they were not covered in her study. Thus, the author should put as much effort as she could to keep the thesis process be done well.

Besides, the blockchain in logistics/supply chain is quite a new topic. There were some blockchain applications in industry, but the blockchain is still confusing to companies. Therefore, finding and choosing sources of materials were unavoidable obstacles.

1.7 Key Concepts

Below are the main key concepts which build the structure of the thesis. In the theoretical framework chapters, other related concepts and definitions which help readers understand content would be explained as well.

Logistics refers to the movement of goods, services, and even people in some specific cases. All the movements ought to be organized well. In trade, logistics means the physical movement of goods between participated parties in the supply chain. And international logistics systems would include a complicated web of carriers, forwarders, banks, agents, traders; global transactions/trades, and movements of goods and services, obviously (Wood, Barone, Murphy & Wardlow 2002, 1.).

"**A bill of lading** is a document. Generally, it must be signed by, or on behalf of, the carrier by sea." (Aikens, Lord & Bools 2016, 19). Or another definition recorded in Bills of Lading: Law and Contracts that a bill of lading is a document that contains details of goods loaded onboard a vessel. The main function is as a receipt of shipment (Gaskell, Asariotis, Baatz 2014, 1.).

It could be understood that ‘’a **blockchain** is a decentralized database of transactions that can be shared by enterprises without the need for a central authority." (Cottrill & Harris 2017, 18).

One of the iconic characteristics of blockchain is **distributed ledger**. It is recorded: "Distributed ledger is a transaction database shared amongst multiple entities-individuals and institutions-across the world. Every transaction is visible to the whole network. Any update or change becomes immediately available across the network, thus bringing a great amount of transparency and transaction accuracy into the system." (Zycus 2018, 5).

"**Smart contract** can self-verify their own conditions and self-execute by releasing payment to the appropriate party. Contracts could be originated to include multiple parties across an entire supply chain with the value and terms fully integrated from end to end and with the execution of the conditions at each stage recorded against the contract and fully visible to the onward chain." (GEP 2019).

Website application or web app, in short, is an application runs through a website browser (Messenlehner & Coleman 2014, 1.).

1.8 Commissioning Company

In 1865, it was recorded that the first sailing vessel, which was named the SS "Amoenitas", was delivered to the Heinrich family by the Sietas shipyard in Hamburg. Over the next 150 years, five generations of the Heinrich family continue their involvement in shipping. Then in 2007, SAL had become a joint venture with the "K" Line Group in Tokyo, Japan to implement operations. And in 2011, SAL had been acquired by the "K" Line. After 6 years, the Harren & Partner Group becomes the new owner of SAL Heavy Lift. The company remains as its own brand and grows in fleet size. Soon later in the same year, SAL Engineering GmbH is founded in Hamburg as an independent and consultancy house – a sister company to SAL Heavy Lift. (SAL Heavy Lift 2019.).

Today, the headquarter of SAL Heavy Lift GmbH locates in Hamburg, Germany with offices in 9 countries and agents in more than 20 countries. SAL Heavy Lift provides clients with three main services, including in-house - engineering service, heavy lift shipping, and marine projects. There are three key service routes that SAL has been providing: Europe – Asia via the Middle East, Europe – West Africa – Cape – East Africa and Asia – East Africa – Cape – West Africa. Besides, further destinations on inducement are also reached by SAL vessels such as Australia, North America, and South America.

Because of global operations, each agent would have its own areas to receive client's inquiries for freight indications. Separately, SAL Heavy Lift Finland Oy is the direct case which the author implemented the thesis project with. This is an agent which operate services in some specific countries assigned by the German headquarter. As mentioned above, SAL would have shipments from one country to the other. Traditionally, the Bill of Lading (B/L) document would be delivered by courier to shipper or consignee. And this creates harmful risks and huge costs to any related parties in the fixed business. Firstly, the time of delivery by post is at least three days, even it might take nearly one week for the consignee to receive the document. Security is the second risk concerning all related parties. If the document is missing, it is totally dangerous. Anyone who has a document in

hand would have the right to receive cargo which values at least hundreds thousand euros. The third difficulty is the amendment. Once the original of the document is released and sent to another party, it is a challenge to fix it. And many legal terms related if a fault document is used to proceed discharging and payment. Finally, manual work is the cost which the company tried to reduce to focus on more important and beneficial tasks. With the electronic Bill of Lading, in a perfect scenario, it could provide solutions for all listed problems.

2 Project Management Method

As stated by Walliman (2018, 7), "Research methods are the techniques you use to do research. They represent the tools of the trade, and provide you with ways to collect, sort, and analyze information so that you can come to some conclusions".

There are two forms of research: primary research and secondary or known as desk research. In order to conduct informative and analytical thesis content, both forms were implemented. For primary research, the author would have face-to-face interviews to collect data. Then for the secondary research, she would look for trust-worthy academic data such as books, company articles, press releases, et cetera, and relevant data collected from previous researches to have a background of knowledge, compare and analyze data.

During the research process, collected information or data was categorized into two types based on their characteristics. In general, whether data can be presented in number or in words. Hence, there are different ways to collect, record, and analyze for a separate type of data. For related science and society researches, numbers usually present the recorded counting information or measurements and on which mathematics can be operated, for instance, population density and annual sales. This type of data is named as quantitative data. In order to analyze quantitative data, statistical techniques are usually used to support delivering conclusions or statements. In contrast, to quantitative information, ones are referring to personal opinions, beliefs, feelings, judgment et cetera called qualitative data. And those cannot be recorded as numbers but words. We could assume that based on two defined types of data, researchers would be able to conduct two kinds of research methods: quantitative and qualitative methods.

Considering in this thesis, qualitative research was mainly applied to analyze collected data and to conduct thesis content. Some figures would be collected to support analyzing the thesis topic and developing content.

2.1 Qualitative Research

In the Sage Handbook of Qualitative Research Method, 3rd edition, a definition of qualitative research is described:

> Qualitative research is a situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible. These practices transform the world. They turn the world into a series of representations, including field notes, interviews, conversations, photographs, recordings, and memos to the self. At this level, qualitative research involves an interpretive, naturalistic approach to the world.

(Denzin & Lincoln 2005, 3.)

According to the definition above, regarding this thesis, the writer would conduct face-to-face and, or virtual interviews, conversations, and recordings to define the company's demand of blockchain for Bill of Lading, to have a basic understanding about blockchain technique used for the process, to figure out the working process of blockchain-based website application for electronic Bill of Lading. Eventually, the author would plan a pilot project shipment, including the electronic Bill of Lading flow through the suggested blockchain-based website application.

2.2 Project Management Map

The research method of this study was qualitative research. Below is the map of the project process, which guided project implementation.

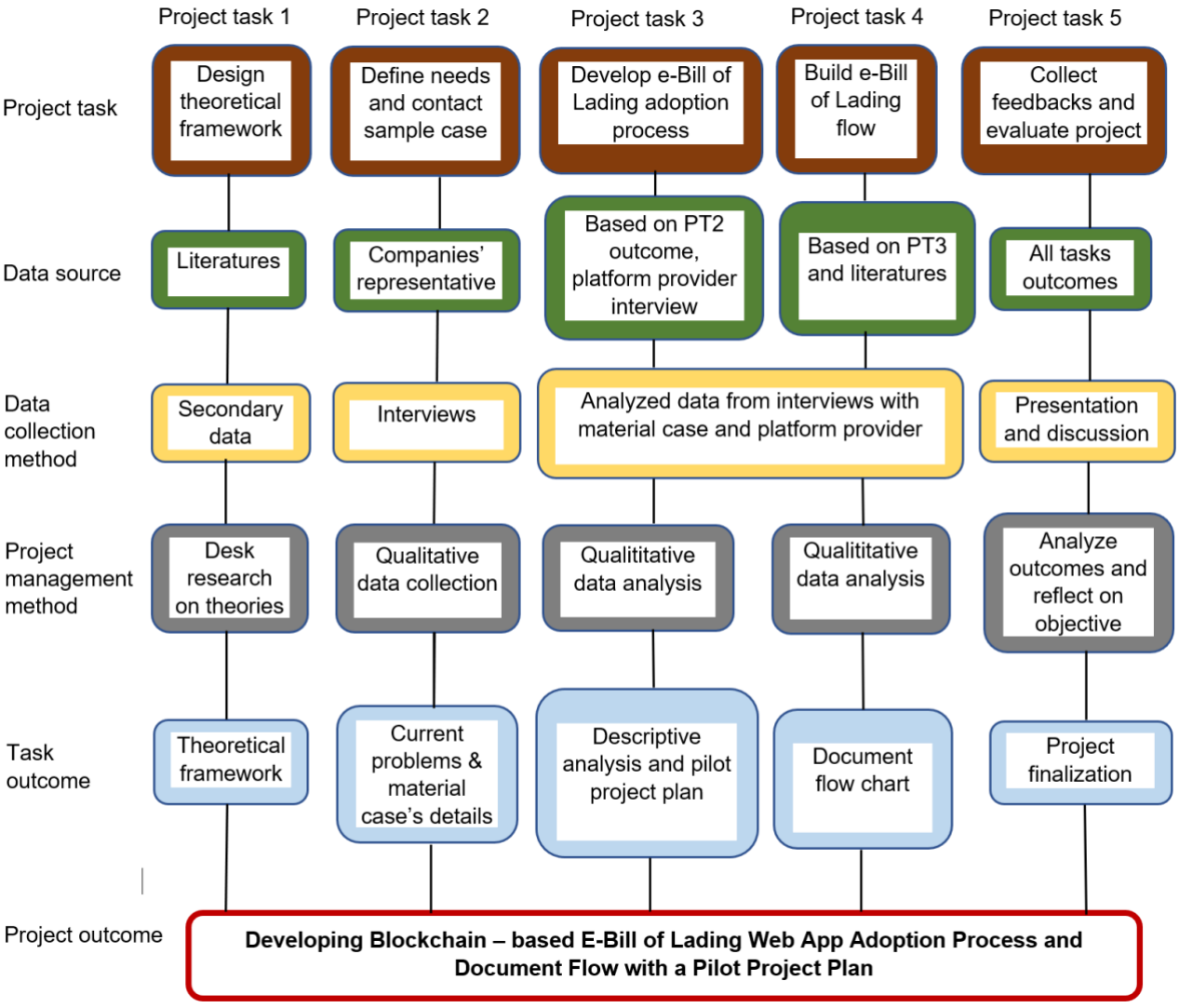

Figure 2. Project Process

To start the project, the related theoretical framework should be done by collecting secondary data from academic sources. This step could generally draw an overview of the project and limit the main topics included in the project as well. Then, the project idea would be proposed to the company representatives for further discussions about the company's needs of the electronic Bill of Lading platform, and case material would also be contacted to collect essential data. The expected results were the electronic Bill of Lading processes through website application, comparison of existed platforms for the supplier selection process, and a proposal of a pilot project with recommended platform provider to the company. Last but not least, a meeting was arranged to present the thesis project and feedback from the company was gained to evaluate the project process.

3 Ocean Bill of Lading

In this chapter, the background of the Ocean Bill of Lading (OBL) was explained through its definition, functions, process, and some further legal issues. Then, the future of Ocean Bill of Lading - electronic Bill of Lading was defined and explained in detail. The pros and cons of electronic B/L were also included to support the intension of replacing traditional OBL with the electronic version.

The Ocean Bill of Lading (OBL) is recognized as one of the most crucial and essential in the shipping industry due to its functions and lawful role in trading by sea. Back to the 16th century, it was the marked time of commonly using OBL in which mostly the quantity of packages or bales shipped were recited. In a few cases, the condition of goods also was recorded in the document. Later in 1802, more principles governing OBL had been established by merchants about the master's liability of actual goods condition. Then in the 19th century, the legal ramifications of the OBL continued being developed further in detail based on real situations and related - OBL cases while manipulating the document. (Murray 1983, 690 – 692.)

Today, The Ocean Bill of Lading (OBL) has been becoming the more important and indispensable document that may impact the shipping and payment processes.

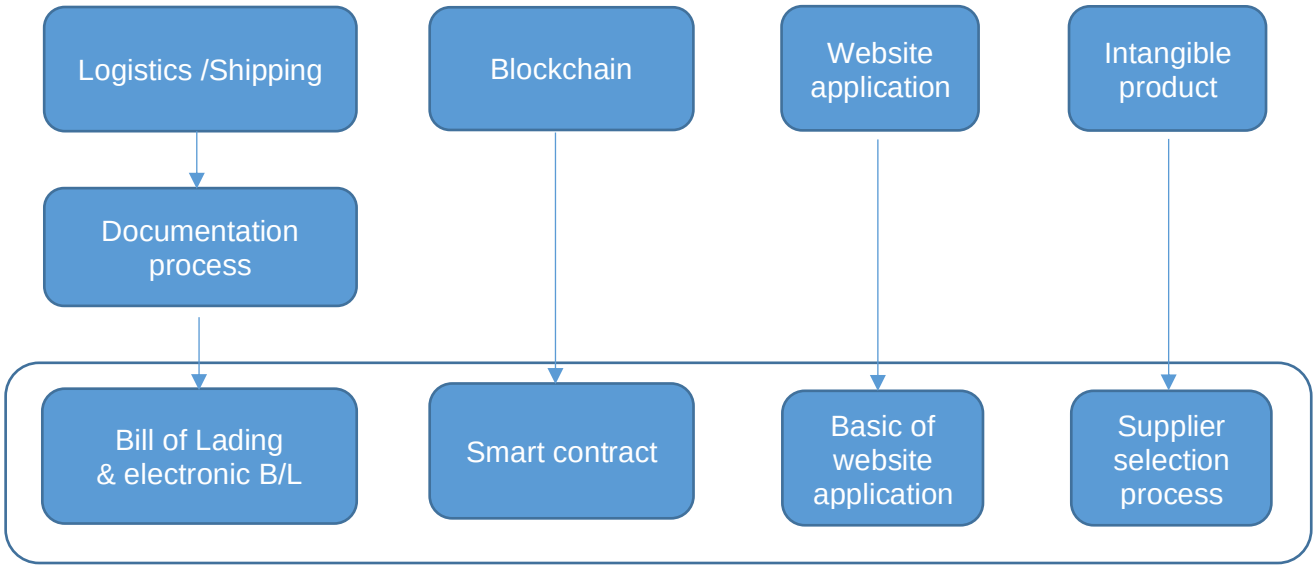

Figure 3. General Theory Framework

3.1 Definition of Ocean Bill of Lading

The Ocean Bill of Lading (OBL) was simply defined as a document that was used in the international carriage of goods by sea transport (Yiannopoulos 1995, 4). It was simply recognized as a receipt between the shipper of goods and carrier. In detail, the document specifies that the exporter (merchant/shipper) would consign agreed shipment to an international carrier for transportation to a defined foreign consignee and signifies the terms of the contract of carriage.

Important term definitions included in an OBL were listed as below:

Carrier: a person or company that provides transportation service for either the exporter (merchant/shipper) or the buyer (consignee).

Merchant / Shipper: a person or company who is usually the supplier or owner of commodities shipped. Also, be known as the party responsible for packing and preparing all the booked goods.

Consignee: a receiver of the shipment and usually be the owner of the goods. The party listed as the consignee on the OBL is legally requested to be present to collect the shipment once arrival.

Notify Party: a contact person or agent to be notified when the shipment arrives at the destination. The notify party can be the buyer, the shipping agent, or any other entity. The notify party is usually responsible for arranging customs clearance at destination.

Port of loading: the place or port where the goods are loaded onto the vessel.

Port of discharge: the place or port where the goods are unloaded off the vessel.

Description of goods: the details of the booked items including the number of units being shipped, weight, and the dimension of goods, along with the nature of the cargo. If there are any dangerous or hazardous goods, the Department of Transportation hazardous material designation is tagged, and it should be cited on the OBL to follow special rules and requirements during shipment. Besides, any special notes or remarks are also mentioned in this section.

Shipped on board date: the actual date when the cargo was loaded on vessel based on Mate’s Receipt and other documents.

Besides, the other page of OBL should include the Conditions of Carriage list and/or reference to conditions listed in another document such as the Charter Party.

3.2 Ocean Bill of Lading Functions

To have the intimate insight of the Bill of Lading than the definition above, the functions and process of the Bill of Lading would be explained in this chapter. With the knowledge of the Ocean Bill of Lading functions, it is easier to understand the importance and essence of the Bill of Lading to the shipping industry. And the legal context would be more logical and easy-to-understand.

3.2.1 Ocean Bill of Lading Functions

The Ocean Bill of Lading (OBL) functions contains three key elements as following: a receipt for the goods, evidence of the contract of carriage between involved parties, and finally a document of title to the shipped cargo. After the endorsement of the Ocean Bill of Lading, the ownership of cargo could be transferred if no problem occurs. (Yiannopoulos 1995, 4.)

First of all, the OBL is seen as the receipt for the goods, which indicates the cargo has been received by the carrier from the shipper. All necessary information should be recorded in the original document so that the document would be passed through without issues fast by the authorized banks. The document content should base on the Mate's Receipt, the shipper's instructions, the final packing list / final case specification, the Statement of Facts, et cetera. Especially, the signature from the authorized person or agent is always required at the end of the document.

The next role of the Bill of Lading in shipping business is the proof of shipment contract, which is used to proceed payment with banks through Letter of Credit. Usually, the issued original Bill of Lading should be presented at the bank no later than 21 days from the "shipped on board" date recorded in the document.

The third important role is the document of title to shipped cargo. After the endorsement of the Ocean Bill of Lading, the ownership of cargo could be transferred if no occurred problems. Then the holder of the document is entitled to possession of the shipped cargo. The holder of the document must present the document to the carrier's agent at the port of discharging to receive the cargo.

3.2.2 Ocean Bill of Lading Process

Eventually, the importance of the Bill of Lading document set cannot be refused during shipments. And it is also mandatory for every party to understand and acknowledge well the document flow and related legal issues which may happen during the implementation of projects. Thus, the signed contract would be executed efficiently and successfully.

The following figure visualized the typical Bill of Lading flow with Letter Credit payment method:

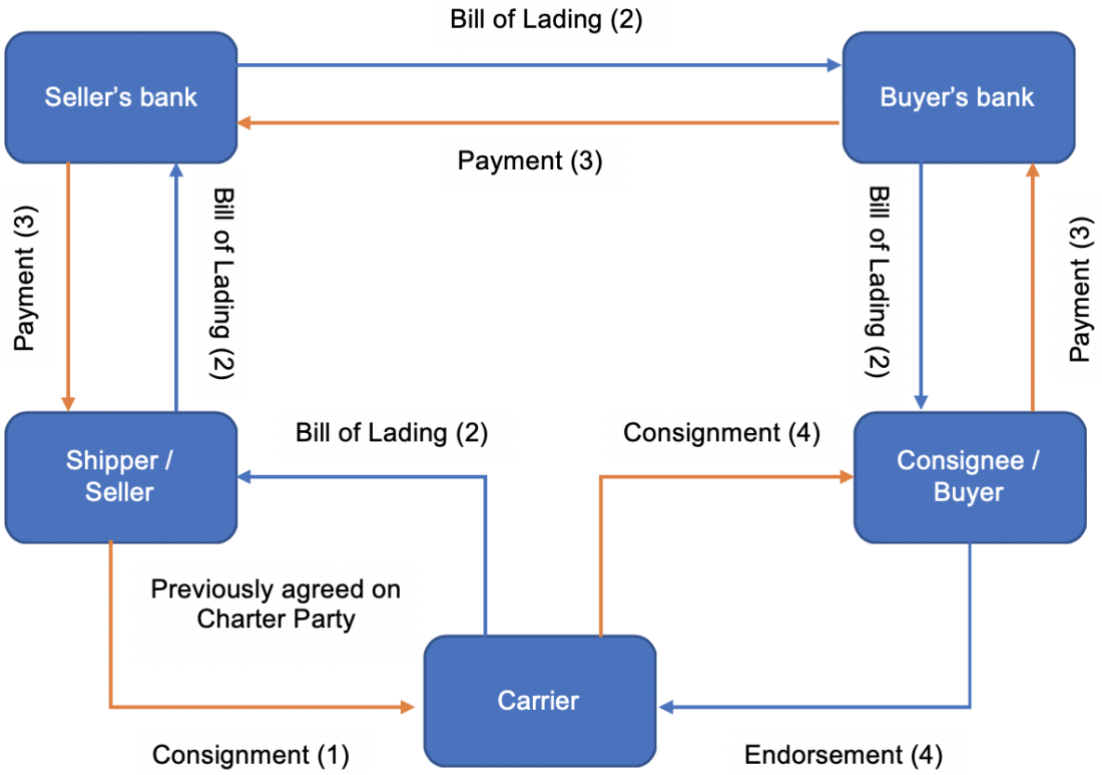

Figure 4. Bill of Lading Flow

This thesis focused on the carrier's perspective, as well as the Bill of Lading document. Therefore, the above figure mainly showed the flow of the Bill of Lading from the beginning to the very end process. The flow is applicable when the letter credit – a letter guaranteeing that payment will be fully proceeded on time from the bank, is valid for the concerning shipment. Otherwise, the original Bill of Lading and payment are simply between shipper and consignee without banks.

The very first thing to notice is that the Bill of Lading should be created by the carrier once the Charter Party document between merchant and carrier has been signed, and the cargo loading activity has been executed. Normally, the Bill of Lading document would base on the Charter Party, the instruction from the merchant, the Mate's Receipt, the

Statement of Facts, and the Manifest from loading port agent. After being checked by both merchant and carrier, the original would be released and sent to banks for document presentation to proceed the payment, as well as to Buyer for document endorsement at discharging destination.

Once loading finished, the original Bill of Lading could be issued based on the agreed draft between merchant and carrier beforehand. Usually, the original set has three copies which include original stamp and issuer signature on and seven copies of the not negotiable document. Then, the document set would be sent to the destination instructed by the merchant. It could be the merchant office, the merchant's bank, or even to the consignee. Banks of both sides would check the documents and proceed the payment if no discrepancy. Once the consignee has Bill of Lading, they must endorse the document to transfer the ownership of cargo mentioned in the paper. Finally, discharging activity would be operated and complete the shipment project.

3.3 Related Legal Issues of Ocean Bill of Lading

Since one of the most principal functions of the Bill of Lading is the document of title to the shipped cargo. In other words, whoever keeps the Bill of Lading in hand, they would be the owner of the referred cargo. And it is considered as a receipt as well. Therefore, the information included in the Bill of Lading is extremely important and consistent with other original documents. For instance, the cargo details should be the same as the one indicated in the Mate's Receipt and the final Packing List. Any remarks recorded during and after loading by the surveyor also ought to be presented in the Bill of Lading. Those could be found on the Mate's Receipt and the Manifest sent from the port agent. If discrepancies found by any partied after issuance, it is compulsory to amend the document accordingly as soon as possible. Otherwise, it would create fraud in the document and the next steps might not be executed. Consequently, it could be concluded that all recorded information in the Bill of Lading must be correct, consistent, and clear to be passed through.

However, sometimes due to some unexpected events after document issuance, the new set of original Bill of Lading ought to be prepared to replace the wrong one. Always if any discrepancy found in the document after issuance, then the Bill of Lading must be amended and switched as soon as possible to avoid costs and any probable risk. However, there is information that should never be allowed to be changed such as clauses and terms on the document or "shipped on board" date. Because these changes would dramatically affect the signed contract and agreed terms of delivery.

Besides, there is a significant consideration while switching the Bill of Lading document that only one Bill of Lading set is available, valid, and used for further steps such as payment and endorsement. The reason is that the Bill of Lading's function includes the document of the title role. If two sets of Bill of Lading exist contemporaneously, then the carrier is obliged to fulfill the shipment service for both two referred cargo in paper and is responsible for any short delivery or cargo damage. Hence, the old wrong document ought to be returned to the issuer, free of any endorsement, and canceled or surrendered first as soon as possible. This would help to avoid multiple sets of the Bill of Lading in circulation. Then the amended document would be released and sent to the instructed receiver such as a bank or consignee.

Sometimes, due to unpredictable reasons such as delays in mail delivery, so the vessel arrives at the destination earlier than the original of the document. It means that the consignee does not have enough time to proceed endorsement before the expiry of free days. Therefore, to avoid paying more costs and consuming time, the Telex Release would be released according to the shipper's or the seller's request. In practice, the Telex Release is considered as a virtual copy of the Bill of Lading. In some cases, the shipper works with the Telex Release, but still the Original Bill of Lading will be created. And presenting the copy of the original should be enough to discharge cargo. However, this type of release would have a high possibility of fraud as it is exchanged via email message.

In some cases, banks do not accept the Bill of Lading with remarks referred to cargo damages or cargo loading incidents. This might cause delays in the transmission of paper document possession, eventually, effect to the payment process and the efficiency of the whole shipment project. Normally, the bank would usually request for a Clean Bill of Lading to credit the freight rate to the seller. Otherwise, the LOI would be preferred to solve the situation with the aim of avoiding detention costs, time, and unwanted losses. Simply defined that LOI is the abbreviation of the Letter of Indemnity. It is an authorized document given by a shipper to carrier. It is used to indemnify the carrier or shipping company against the claims which might be raised when the cargo was not loaded in accordance with the Bill of Lading descriptions. It could be considered as an "insurance" of issuing a clean Bill of Lading against the remarks from the Mate's Receipt for the carrier. However, the shipping company would try not to use LOI as risks are remaining with this method. An LOI may cause a breach of an underlying contract, usually is the Charter Party in the future. And that leads to a null LOI. Besides, the risk of having claims from the third - party is high because it is only the signed document from the shipper or seller to the shipping company. Consequently, the LOI might be a quick solution for incidents of a Clean Bill of Lading. But it could result in wrongful acts depending on each

separate case. That is the reason for the shipping company to avoid using LOI. If it is mandatory, the carrier could carefully check the situation prior to accepting LOI from the shipper. (Hellenic Shipping News, 2019.)

3.4 Electronic Bill of Lading

Consuming time and personnel resources to handle the paper documents could reduce profits and create many obstacles for data storage, auditing and management. Today, visualization and digitalization are popular approaches for companies and organizations to develop and optimize business. Therefore, putting the digital document in use is one of the most available optimal solutions. Based on the thesis scope, the electronic Bill of Lading would be discussed.

3.4.1 Electronic Bill of Lading Definition

It was generally defined as “an electronic record which aims to have the functional equivalence of an original paper Bill of Lading.” (Tricks & Parson 2018, 6.). And as stated in the definition, the e-B/L (electronic Bill of Lading) should be transferred from one relevant party to the other. Certainly, there is only one document holder at a time, and either original or copies of the document ought not to circulate on the business market due to the legal liabilities of the holder and referred parties. Currently, there are some pilots in providing an e-B/L solution to digitalize the document process in shipping to optimize and develop the logistics. For instance, Bolero and CMA CGM are two shipping companies having used the electronic Bill of Lading. Some of them have been intending to transfer e-B/L through a central platform which requires all relevant parties to sign up to a contract under control of a legal system such as English law or Swedish law. Every party has to access the central hub to have the right to transferring and proceeding documents. This kind of system sometimes is indicated as the "Club" system, for instance, IG P&I Clubs. (Tricks 2018, 9). To clarify the previous statement, here is a quick review of the IG P&I Club. The full name of the organization is International Groups of P&I Clubs, which includes 13 unincorporated member Clubs and is managed by a senior Club manager representative. The Group has three functions are being the co-ordination and operation of the Clubs' claims pooling arrangements, providing a forum for sharing information and providing representation for the Clubs and members to engage with governments, legislation and maritime regulators. (International Group of P&I Clubs 2020).

However, according to CargoX – a new provider of a digital platform for transferring document, there are some following problems in the previous digital platform, including a requirement of a central and trusted authority, the impossibility of an online value

settlement, unrestricted and convenient duplication, and nontransparent rules governing the e-B/L process (CargoX 2018, 28).

Lately, thanks to the blockchain innovation, there are some new e-B/L service providers established. And the existing ones have been updating their solutions with more blockchain-based applications. With the blockchain-based digital platform, data or documents are much more secured and transparent. According to the pain points of the company process, the manager would choose the most suitable provider and service for the company. In general, the blockchain development categorized the available e-B/L systems into two generations until now. The first one included Bolero and essDOCS provides a centralized platform to proceed e-B/L based on database and IoT. While the new one offers an e-B/L system integrated with blockchain technology. Since around 5 years ago, some platform providers have been starting the application of blockchain into solutions to enhance the platform's functions and expand the user category.

3.4.2 Digital Documentation Process

In general, the electronic of Bill of Lading process would be controlled in the same way with the paper originals, as Antinakaki from essDocs stated. (Antonakaki 9 April 2020.) Additionally, according to Strommen from the G2 Ocean company, the path of the electronic document was generally similar to the paper one. The writer could come up with a conclusion that the document flow would change nothing but the tool supporting to transfer and endorse documents. Instead of using mail delivery service, papers, physical stamps, and signature, parties could use website application, cryptographic signature and digital files.

Below is a primary digital document flow which briefly visualizes the process:

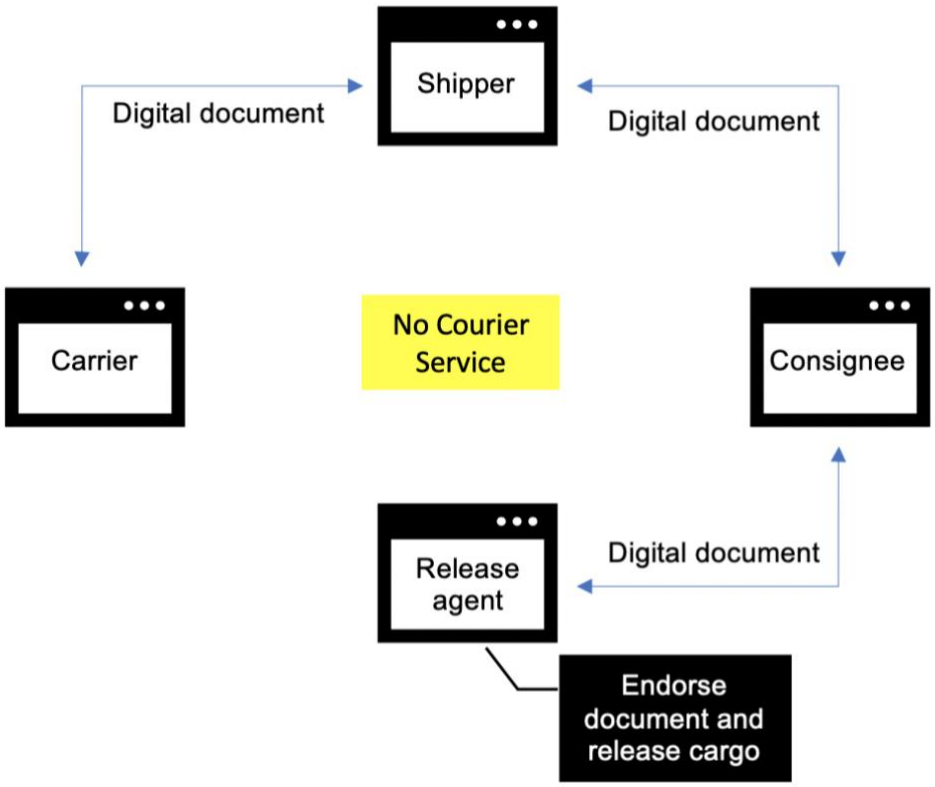

Figure 5. Visualization of digital document flow

With the electronic Bill of Lading, the issuer does not need to print, stamp, sign and mail the document. Consequently, the endorsement would be also implemented through the central platform where e-B/L is created. Every party would acquire a cryptographic key to sign each transaction for transfer files. Besides, the process is secured that only one party could hold to the original at a time and the right of control is passed by transferring ownership to the next party in the established chain.

3.4.3 Advantages and Disadvantages of Electronic Bill of Lading

Every innovation has pros and cons, which each company should consider its possible effects. The question here that it is worth and suitable to investigate and execute innovation.

Positively, the electronic Bill of Lading would bring many benefits to the company. Firstly, it would help to smoothen, speed, and optimize a process that creates better customer service. Hence, the company value chain would get a positive impact. Secondly, today, shipping companies have noticed many "data thief" cases causing a lot of damages to all involved parties. With blockchain innovation, the electronic Bill of Lading could improve the security for shipment documents. Besides, transparency and tracking capability also ease communication among parties and reduce unexpected confusing issues. Having the technology to support paperwork also cuts down the cost of the offshore department, and

produces better results. Eventually, these all positive outcomes would improve the work efficiency of document issuance who is usually the carrier.

As the e-B/L concept is quite a new tool for shipping companies to update, only some pilots have been experiencing this system for a few years till now. Hence, the electronic would not be treated legally in a similar manner with a paper document. Consequently, once shipping companies or agents would like to use the system, they had to check and consider carefully the rules or laws which are applied to their contract of carriage that whether any kind of electronic trading system could be used. (Underhill & Bibby 2016.). In some cases, the electronic title of documents is not accepted in some specific areas. Except for the above-mentioned obstacle, until now more disadvantages of the electronic Bill of Lading have not listed and discussed. The reason could be that there are some shipping projects which apply the electronic Bill of Lading process till now and no failures are recognized. This might be considered as a good sign of transforming the system into digitalization at this stage.

4 Blockchain Technology in Logistics

In recent decades, technology has been ruling all kinds of businesses. For the last five years, we have been getting used to ERP (Enterprise Resource Planning) system to support data management in Logistics and Supply Chain industry specifically. And today, blockchain has been considered to be another key element of international business, especially digital Logistics and Shipping. Not only could support for internal activities and management, but also external.

Specifically, digitalizing businesses is the most trending approach of companies, entrepreneurs and organizations for many decades. However, there is a lack of trust in the IoT (Internet of Things) and the values of each business transaction are huge which should be relied on a legally liable system. And blockchain theory was created and recognized as the "fifth evolution" of computing lately. It can provide trust in digital data which is almost unable to be changed or cleared easily. Eventually, the unique characteristics of blockchain make it possible to be used for legal online transactions.

4.1 General Background of Blockchain

In 2009, Satoshi Nakamoto published a paper titled Bitcoin: A Peer-to-Peer Electronic Cash System, in which the author proposed a solution for online transactions among parties without going through a financial institution. In his English translated paper, pure peer-to-peer network, timestamped transactions – which forming unchangeable records, except redoing the proof-of-work, cryptographic proof and decentralization are specific concepts discussed and explained to build up the Bitcoin system (Satoshi 2009, 1-3.). There are some statements that blockchain is the technology invention behind Bitcoin. Hence, Bitcoin has been considered as the foundation of blockchain innovation.

Later on, theoretically, blockchain is described as three different capabilities: technic, business and law in the book titled The Business Blockchain below:

> Technically, blockchain is a back-end database that maintains a distributed ledger that can be inspected openly.
>
> Business-wise, the blockchain is an exchange network for moving transactions, value, assets between peers, without the assistance of intermediaries.
>
> Legally speaking, the blockchain validates transactions, replacing previously trusted entities.
> (Mougayar & Buterin 2016, 4).

Besides, according to Vjeran Ortynski, Chief Business Development Officer of CargoX in an interview, blockchain is known as:

> Blockchain is a concept of a trustworthy, digital, public transactional network, used for recording transaction event in a public distributed ledger. Strong cryptographic security enables a blockchain to be distributed among public computers – each computer in the chain validates all transactions in a way that it makes it impossible to fake or forge transaction events. The whole system operates without a central computer system, so it is impossible to manipulate or shut it down, and it does not have a central administrator.
> (CargoX 2020).

In other words, the blockchain is a data structure which has a distributed ledger and enables peer-to-peer network for parties in the chain. All have the same three core elements: block – a list of recorded transactions, chain – a hash linking blocks to each other and network. In general, there are three types of blockchain which could be defined as Public Blockchain, Private Blockchain and Permissioned Blockchain. According to Laurence, the author of the book Blockchain For Dummies, three types of blockchain are defined as below:

> Public blockchains: Public blockchains, such as Bitcoin, are large distributed networks that are run through a native token. They are open for anyone to participate at any level and have open-source code that their community maintains.
>
> Permissioned blockchains: Permissioned blockchains, such as Ripple, control roles that individuals can play within the network. They are still large and distributed systems that use a native token. Their core code may or may not be open source.
>
> Private blockchains: Private blockchains tend to be smaller and do not utilize a token. Their membership is closely controlled. These types of blockchains are favored by consortiums that have trusted members and trade confidential information.
> (Laurence 2019, 8).

Either types of blockchain, the technic serves as multiple functions based on the following ten properties: Cryptocurrency, computing infrastructure, transaction platform, decentralized database, distributed accounting ledger, development platform, open-source software, financial services marketplace, peer-to-peer network and finally trust services layer.

After developing the Bitcoin network to secure the Bitcoin cryptocurrency, which is used to trade Bitcoin and exchange value, the community found it is potential for innovation. Then, it is the stage for the Ethereum network. Basically, the Ethereum has the same structure with Bitcoin one but including programming language inside, which aims to be used for trading Ether – another digital currency besides Bitcoin, making smart contracts, building decentralized autonomous organization (DAOs) and securing blockchain application and smaller blockchains. Later, the third evolution in the blockchain is the Factom network. With the much larger capacity of information and lighter consensus, this network is used to secure data, system and build bridges across the blockchains. (Laurence 2019, 12-13.)

4.2 Blockchain Applications in Logistics and Supply Chain

As stated earlier, the blockchain has the base of Bitcoin's invention. Hence, it could be applied to finance or accounting to develop trade and e-commerce. Today, FinTech – Financial Technology is a popular topic for professional discussions. However, due to numerous advantages which the community found out while studying blockchain, the applications are in many other fields as well. While internationalization is getting more and more important and essential, certainly the logistics and supply chain is becoming much more complicated than ever. Eventually, the community has come up with the idea of utilizing blockchain to support these industries. It is a so-called digitalization.

From the perspective of Supply Chain, one of the first pilots in taking advantage of blockchain is Provenance, a technology company creating and providing a digital platform for transparency in trade. The very first impressive project of them is developing a blockchain-based tool for tracking products, especially tuna. Provenance had used the peer-to-peer (p2p) technology to track tuna fishes caught in Makulu, Indonesia from landing to the factory. The company had focused deployment in two main supply chains of yellowfin tuna and skipjack tuna intending to empower the traceability of the whole supply chain which might stop human rights abuses, overfishing and illegal fishing currently happening. The technic base of this project was a consortium blockchain which takes advantage of the distributed consensus to maintain a shared, consistent source of truth at low cost. This approach would be easier than building on the public blockchain which is more worthy due to equality, consensus, network effect and commons results. But because of the resources and limitations of projects, Provenance had chosen the consortium blockchain path. There were three phases included in the project:

- Registration and data collection from the “first mile”: Provenance cooperated with NGOs to set up fisherman registration to the blockchain system. Using SMS messages to input daily catches and suppliers are informed automatically.
- Linking the blockchain with existing systems such as ERP and Tally-O: This phase enables managers to check product flows in and out of factories. The smart contract concept handles the transformation process from raw fish to finished products.
- The consumer experience and building an interface for trust: Consumers could use mobile phones to scan the smart stickers on products to track original. (Provenance 2016).

The other remarkable case is Walmart's. Walmart Inc. is an American multinational retail corporation growing continuously last 50 years into the largest retailer all over the world. It

has approximately 11,500 stores under 56 banners in 27 countries and eCommerce websites. Walmart had considered the consumers' safety, best services and better management as their priorities at that time. Better traceability would help save consumers' lives and protect the farmers from being discarded produce incorrectly. This encouraged company to find out innovations and blockchain was one of the good fits (Walmart Corporate 2020.) Walmart and IBM – a technology partner had executed two projects to test the food traceability system based on Hyperledger Fabric: tracing mangos in Walmart US stores and tracing pork in Walmart Chinese stores. Hyper Fabric is a blockchain framework implementation and one of the Hyperledger projects hosted by The Linux Foundation. The technical base was the permissioned blockchain or called enterprise-grade blockchain by Hyperledger. The outcome was extremely efficient that the needed time for tracing mangos in the US reduced from 7 days to 2.2 seconds. The projects were scaled up later and in 2018, Walmart could trace over 25 products from 5 different suppliers by using the system built by Hyperledger Fabric. (Hyperledger 2018.)

In the perspective of logistics, specifically, marine shipping, the most significant blockchain application is building Smart Contract platforms since back 3 years till now. CargoX is known as the young leading Smart Contract solution provider who has received significant honorable awards and nominations such as the Most Innovative Solution 2019 and best Blockchain Innovation of the Year 2019 at Transport & Logistics Middle East. The company was established lately in 2018, quickly continue to introduce the MVP (Minimum Viable Product) after 3 months to collect the maximum amount of validated learning about customer efficiently. Finally, the platform was launched live in the same year. Following the content would discuss in detail the project using the mentioned platform so as to digitalize the document process in logistics.

The very first successful project in the marine shipping industry was cooperation between CargoX and G2 Ocean in April lasting to May in 2019. The task of this test was transferring ownership of goods with shipments departing from China to Peru. "The CargoX Smart B/L™ enables users to clearly state and transfer ownership, create Bills of Lading, and also attach other accompanying documentation in electronic format." (G2 Ocean 2019.). In an interview via video call with Vice President Innovation of G2 Ocean – Mr. Strommen, he indicated that the process of transferring the Bill of Lading ownership by Smart B/L was basically similar to the traditional way. The carrier, in this case, is G2 Ocean had created and issued the digital original negotiable Bill of Lading on Smart B/L platform. Then it was delivered to the charterer via platform using a crypto key. So as to receive the document, the charterer had to register himself to the platform and get own crypto key. Once received the digital document, the charterer combined it with the invoice and packing list then sent them to the customer and agent in destination to proceed the

payment in advance and transfer ownership when the vessel would arrive at the destination port. Eventually, the path of document flow was not different when using a digital document, but all information and original documents were stored on the Smart B/L platform and each involved party should get a crypto key to access. (Strommen 24 March 2020.) About the technology used to build platforms, CargoX decided to use the public blockchain network, particularly the Ethereum network. This one "requires computer users or server operators to run cryptographic software that listens to network requests, calculates responses, and validates transactions." (CargoX 2020). The service process was explained in detail as below:

> Our innovation was to enable companies to transfer these documents through a blockchain document transaction system. This is quite similar to using e-mail or transfer money through online banks – but here, users can actually transfer the ownership of a document, and then use blockchain technology to unequivocally validate the current owner.
> (CargoX 2020).

The efficiency of utilizing blockchain for the document process could be proved by saving time, security and saving document transfer cost. Moreover, platform users would be also provided a unified, integrated, single-point-of-access document archive simultaneously. In reality, the result of project shipment was saving a huge amount of time that reduced from days of document delivery to a couple of minutes. The most important unique advantage was security for such valuable papers while transferring to the importer in Peru. In general, "This new approach prevents delays and business damage or loss, demurrage and other costs. And it provides a level of safety and reliability never seen before in the business world." (CargoX 2020).

The other digital platform defined as an open and neutral supply chain platform based on blockchain technology is TradeLens. This is the joint development result of both A.P. Moller – Maersk and IBM to apply blockchain to the global supply chain. TradeLens offers customers with the capability of sharing and collaborating true real-time information, so it helps increase industry innovation, reduce trade disputes and encourage international business. In the early phase, 94 organizations were being involved or agreeing to participate program, including more than 20 port and terminal operators, Pacific International Lines (PIL) as global container carriers, some customs authorities in the Netherlands, Saudi Arabia, Singapore, Australia and Peru, cargo owners, freight forwarders, transportation and logistics companies. The general intentions of the TradeLens program were the establishment of a single shared view of a transaction without compromising details, privacy or confidentiality to support the collaboration of multiple trading partners, and enabling digital collaboration across the multiple parties involves in global trade by using Blockchain Smart Contract (Maersk 2018).

About the blockchain technic, TradeLens uses the permissioned type, particularly the IBM blockchain platform based on Hyperledger Fabric. In the concept of logistics and shipping, TradeLens provides a solution called TradeLens Core. It concludes a set of platform tools allowing users to publish and consume data and important shipping documents within the permissioned community. Especially about related shipping documents subject, there are not many differences between Smart B/L invented by CargoX and TradeLens. As basically, TradeLens also provide three following capabilities:

> - TradeLens enables efficiency with structured document forms, while also handling scans and images.
> - Documents are managed on a blockchain so that there is one single source of truth.
> - A simple, auditable, and trusted document workflow reduces errors and simplifies the process of trade.
> (TradeLens 2020.)

However, the TradeLens' approach, by thesis author, is assumed to develop a full set of integrated tools for supply chain or logistics management including document digitalization, data management, tracking system, financial service and other linked solutions for users. The platform targets many different customers who are involved in supply chain and logistics. While CargoX's intention is to focus on building a platform for transferring documents and/or related document services at this moment.

5 Blockchain-Based Electronic Bill of Lading Website Application

Currently, website application or web app, in short, is no longer strange to end-users, all kinds of companies and organizations. Web apps are created to utilize some specific performance of the website. They are programs on the internet that can be accessed via a web browser such as Safari, Chrome or Firefox. Usually, companies and organizations use web apps to support management and operation activities. Especially, e-commerce has been growing fast and strongly until now, and it is continuing to develop.

In the concept of blockchain in Logistics, the updated approach for carriers or shippers lately has been integrating blockchain into a web app to digitalize project management, documentation and/or offshore activities, with the goal to reduce personnel costs, enhance management and support customer services. Since lately three years ago, many pilot projects have been testing blockchain-based web apps to support for shipping business.

In this chapter, the basic details of blockchain-based website application and challenges while executing the innovation adoption process. However, the thesis writer's background was in International Business. There are some limitations in explanation and academic knowledge.

5.1 General Background of Website Application

The web app is either a website or an application in the desktop or personal computer (PC), but it is a combination of both which contains functions of both. As explained in Building Scalable Web Sites by Cal, "a web application is comprised of data with a separate delivery mechanism" (Cal 2006, 2.). The web app uses a combination of server-side scripts and client-side scripts to perform information to users.

There are some common features associated with web apps:

- Interactive elements: Web apps can have some similar experience including navigating through scrolling and hyperlinks with a website, but web apps tend to use other methods through the app instead. The web app would have more interactive UI elements such as toolbars, rich text editors, drag and drop function and sliders.
- Tasks: The purpose of a web app is to help the users execute specific tasks including even content-focused tasks such as Twitter or LinkedIn. However, the browsing experience is totally different.

- Logins: This feature allows web apps to save users' information which is used to enable main tasks and persistent experience.
- Device capabilities: While running web apps on a mobile phone, those apps can access the camera, address book, internal storage and location details. Similarly, running on a desktop, web apps can access a webcam or local hard drive.
- Work offline: This is a good idea for web app features. As web apps would not stop working when they are offline. For instance, the Gmail web app still allows users to create drafts offline and users can send emails normally once the Internet is connected.
  (Messenlehner & Coleman 2014).

Below is a map presenting a typical web app flow:

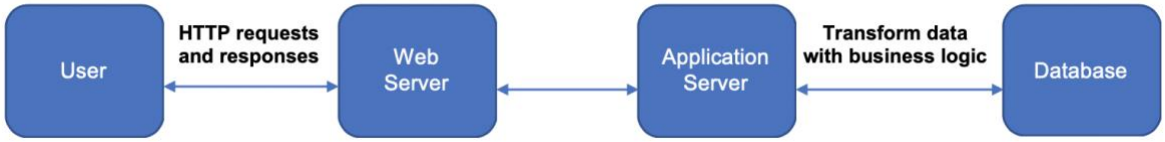

Figure 6. Simple Web App Flow (adapted from Educative s.a.)

5.2 Blockchain-Based E-B/L Web App

A blockchain bases website application is an integration of blockchain into a web app to advance the web app performance and functionality by using advantages of blockchain technology. Technically, the blockchain code would be integrated into the back-end of a web app to validate Blockchain functions for the web app. There are some benefits of blockchain-based web apps as following: Public verifiability, transparency – based data and state update process, privacy, the integrity of information and trust anchor. (DDI Development 2018).

Supported by blockchain characteristics, the blockchain-based web app would have some advantages compared to previous platforms:

Table 2. Advantages of blockchain based platform (CargoX 2018, 38 - 42).

Advantage	Explanation
Browser-only	Users do not need to install any software or applications.
Minimum investment	There is no installation or integration, users can start using the platform right after registration.

Multi-user support	Multiple users from one company or organization can use the platform at many permission levels.
Security and safety	The distributed ledger records permanently all transactions that creating transparency and allowing auditing all events. Due to the absence of a central registry, there is no chance for hackers to attack the system until now.
Transparency	The current state of documents is always visible to all involved parties.
Minimum risks	Each action on a blockchain is recorded with a timestamp. Hence, it is auditable and enables fraud-proof.

In general, the core function of the digital platform is to support creating and transferring ownership of important documents, in this case, it is the Bill of Lading. Besides, there are more integrated functions which might support for users depending on their needs. For instance, there is the support for the Letter of Credit and escrow service, support for customs or support for reporting.

5.3 Challenges of Transformation to Electronic Bill of Lading

Even though plenty of advantages of a blockchain-based web app have been noticed and it might be considered as the game-changer for the digital world in the next 5 or 10 years, there are still some challenges.

The first obstacle is the user's habits. Obviously, every involved party in logistics, especially marine shipping is so familiar with the paper Bill of Lading that they find it hard to change to digital format. The training session should be implemented to not only the carrier who issues the document, but also the shipper, consignee, custom authority, vessel captain, banks, port agents and other related parties. It is easy to train the new tool usage, but the user's belief would take time to gain. As they all should acknowledge what they are working with and how everything works with a new tool, then they might accept the digital version of the document as a standard one.

Secondly, the unawareness of blockchain-based app and the lack of reputation of service providers are also challenges for both technology providers and document issuers, in this case, are carriers. It is required that the shipper, consignee and other parties working in one shipment project ought to register and use the same platform to transfer the document. Consequently, carriers whoever want to use digital platform must have an agreement with shipper, consignee, custom authority and/or authorized bank to use a digital document to implement shipment.

Thirdly, though the BIMCO – the largest direct-membership organization for shipowners, charterers, shipbrokers and agents supported for the electronic Bill of Lading, if the banks are invited to join digital process, it totally depends on local authorized banks to accept the digital document, also the same to custom authority, local port agent and local legislation.

The mentioned obstacles might take time and effort to overcome. However, it is worthy of investing in new updated technology as the world is now moving to the digitalization era. In the near future, the world of automatization, digitalization, artificial intelligence and machine learning will be defined with clarity.

6 Supplier Selection Process

Currently, technology tools are now considered as an indispensable part of enhancing efficiency and companies or organization expansion. There are many technology companies supplying tools and applications for others in different industries with the aim of business optimization. Depending on each company's demands, there are suitable technology solutions. Hence, it is important to choose the most appropriate tools or solutions provider to avoid consuming company investment.

This chapter would give readers an overview of supplier selection process theory from the Supply Chain industry which could be applied to sort out the best supplier for a blockchain-based web app for the electronic Bill of Lading.

6.1 Intangible Product

Generally, the product can be divided into two groups – tangible and intangible products. It is not compulsory that products must be tangible that consumers can physically touch and see. But the product could be intangible such as services, technical solutions or education. For instance, the service of shipping cargo by vessel or providing of software or applications is also considered as a product but an intangible one.

As the thesis focused on intangible product – blockchain-based web app, then the framework is written about intangible products mainly. An intangible product is defined as a product that consumers seldom try out or test in advance. The potential buyers have to depend on surrogates to imagine what they will get. Some popular examples are insurance, consulting service and education (Theodore 1981.). Certainly, tangible products are not absent from human daily lives. However, due to community development and life quality improvement, the intangible product plays an important role in business nowadays. It could even add more customer value into tangible products that are delivered to consumers. The maintenance service of machines is one of the most noticeable examples for the previous statement. There are three categories of intangible properties that create customer value: knowledge, emotion and experience.

Knowledge is a key element that guides the customer's consideration of choosing products. This category is related to customer's perception of expertise and capability of suppliers and products. It would create belief in the product as a potential one. Especially, new customers would be easily impacted by others' knowledge having experienced products by recommendations or reviews.

The other category is the emotion which is in various forms but simply defined as positive and negative feelings. Clearly, suppliers always want to arouse positive emotions in consumers that support building a loyal relationship between them. Once the relationship is established, it means suppliers would have a high commitment from customers despite negative information.

Lastly, the experience is an important factor connected to customer satisfaction. Good experience would make customers willing to repeat satisfaction created by-products. Over time, this would form a loyalty of customers towards specific suppliers. Experience is the most significant element as it is only obtained when customers truly buy products, which affect the other two mentioned categories. (Steiner & Harmon August 2009, 2068 – 2071.)

6.2 Supplier Selection Criteria

The initial model of selection criteria was built by Dickson in 1966. The model includes 23 criteria which are ranked by the level of importance. There are four levels: very high importance, great importance, medium importance and low importance. Later in 1990, Ellram developed selection criteria table which emphasized the importance of qualitative criteria supporting the long-term relationship between suppliers and consumers. Being different from Dickson's, Ellram's criteria were not categorized based on the level of importance. It includes four groups: financial aspects, culture and strategy of supplier's company, technology assessment, and other factors. And it mainly focuses on the supplier's capability and management generally rather than product details.

The following are two tables of selection criteria that are usually mentioned among the supply chain community in the previous century.

Table 3. Dickson's supplier selection criteria (Dickson 1966)

Number	Criterion	The importance of criterion
1.	Quality	Very high importance
2.	Delivery	
3.	Performance History	
4.	Warranties & Claims Policies	
5.	Production Facilities and Capacity	Great importance
6.	Price	
7.	Technical Capability	
8.	Financial Position	
9.	Procedural Compliance	
10.	Communication System	
11.	Reputation and Position in Industry	
12.	Desire for Business	
13.	Management and Organization	
14.	Operating Controls	
15.	Repair Service	Medium importance
16.	Attitude	
17.	Impression	
18.	Packaging Ability	
19.	Labor Relations Record	
20.	Geographical Location	
21.	Amount of Past Business	
22.	Training Aids	
23.	Reciprocal Arrangements	Low importance

Table 4. Ellram's supplier selection criteria (Ellram 1990)

Number	Criterion	Number	Subcriterion
1.	**Financial aspects**	1.1.	Economic performance
		1.2.	Financial stability
2.	**Organizational culture and strategy issues**	2.1.	Trust
		2.2.	Management attitude/outlook for the future
		2.3.	Strategic fit
		2.4.	Top management capability
		2.5.	Capability across levels and functions of buyer and supplier firms
		2.6.	Supplier's organizational structure and personnel
3.	**Technology issues**	3.1.	Assessment of current manufacturing facilities/capabilities
		3.2.	Assessment of future manufacturing capabilities
		3.3.	Supplier's design capabilities
		3.4.	Supplier's speed in development
4.	**Other factors**	4.1.	Safety record of the supplier
		4.2.	Business references
		4.3.	Supplier's customer base

In the early 21st century, there are some new criteria lists based on changes in customer's priorities about products. One of them is the criteria of Cebi and Bayraktar developed in 2003. This one has a balance between the qualitative and quantitative criteria that might assist for overall supplier evaluation.

Table 5. Supplier selection criteria (Cebi & Bayraktar 2003)

Number	Criterion	Number	Subcriterion
1.	**Logistics**	1.1.	Delivery time
		1.2.	Support lots
		1.3.	Flexibility
		1.4.	Reliability
2.	**Technology**	2.1.	Capacity to meet damand
		2.2.	Involvement to formulating new porducts
		2.3.	Improvement effort in their products and processes
		2.4.	Problem solving capability
3.	**Business**	3.1.	Reputation and position
		3.2.	Financial stability
		3.3.	Management skills and compatibility
4.	**Relationship**	4.1.	Easy communication
		4.2.	Past experience
		4.3.	Sales representative's competance

6.3 Supplier Selection Process

According to Monczka, the supplier selection process includes 7 steps as following: recognizing the need for supplier selection, identifying key sourcing requirements, determining a sourcing strategy, identifying potential supply sources, limiting suppliers, determining a method of supplier selection and selecting a supplier to reach an agreement.

Below flow is an overview of whole process (Monczka 2011.)

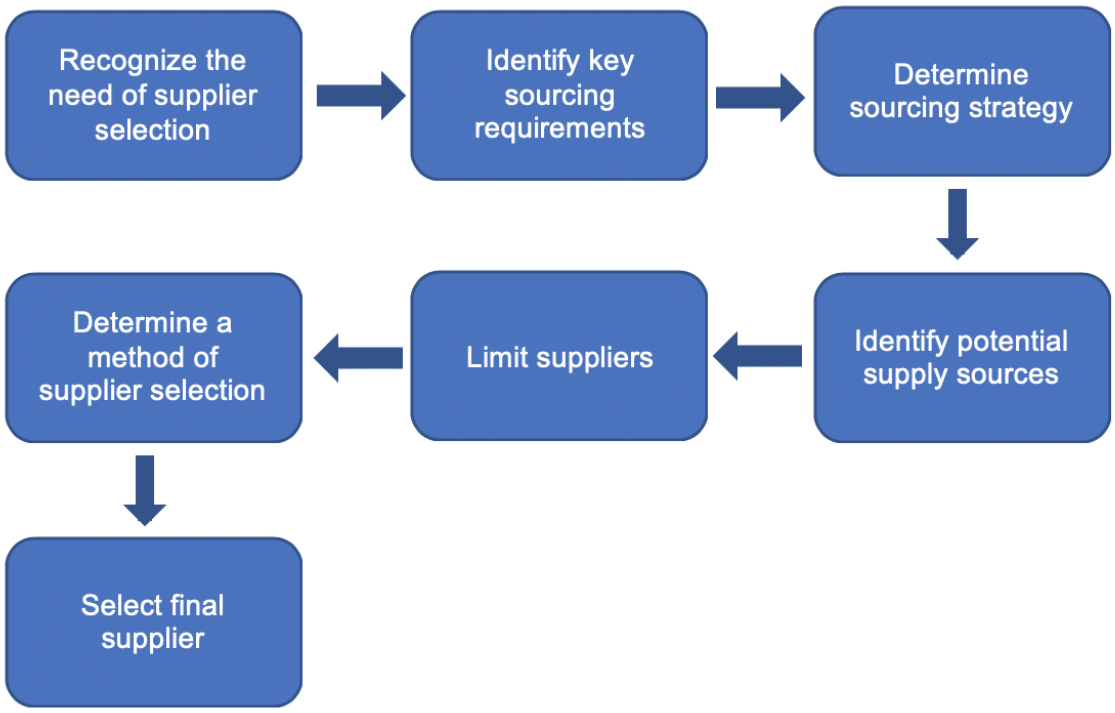

Figure 7. Supplier Selection Process (Monczka & al. 2011)

The very first step to start the whole process is realizing the demand for supplier selection. The trigger question of this phase is how and when companies know that a need for

supplier selection and evaluation pops up. This is the moment that companies notice and try to identify current problems that affect company business. Based on the first step, the key requirements for new suppliers are noted. These requirements would later support to evaluate the suppliers. Also, a sourcing strategy should be determined for each requirement. Then, the intensity of the search is implemented to identify potential supply sources. When companies have a pool of choices, preliminary evaluation is the next phase to narrow down the list. After that, companies would have some most potential candidates for final supplier selection. It is time for deeper evaluation to choose one out of all suppliers. Lastly, the negotiation to reach an agreement would finish the selection process.

7 Developing Blockchain-Based Electronic Bill of Lading Platform Process for Case Company

The case company is considered as one of the global leading carriers specializing in the marine transport of heavy lift and project cargo. Hence, companies' vessels have been moving all over the world usually, from one country to the others or even one continent to the others. Consequently, the Bill of Lading document is usually posted by reliable and fast service providers such as DHL or UPS, particularly in Finland, Posti is an option as well.
However, it might take several days for receivers to get the document. And it is risky if the document is missing or getting stuck in some transfer points in the middle due to the ownership of the document. According to the thesis writer, the electronic Bill of Lading might be the game changer to the company business, the shipping industry in general.

In this chapter, the current situation of using the Bill of Lading in the paper would be described, followed by the adoption process for the company to take advantage of the blockchain-based electronic Bill of Lading platform would be presented following.

7.1 Defining current problems with traditional Bill of Lading

Since the beginning, every contract, agreement or important documents are always written on paper, signed by related parties and even stamped as it used to be the only method to store data. However, every subject always has pros and cons depending on context and perspective. Using the paper version has both advantages and disadvantages as well. And it is not an exception to the Bill of Lading. There are some common difficulties with paper documents such as missing, forgery or consuming time. In the case of the commissioning company, there are four main problems with the paper Bill of Lading: consuming resources, risk of fraud, speed and security.

The first obstacle being very popular with every kind of paper document is consuming resources such as personnel, paper, time, costs, et cetera Regarding of Bill of Lading, each document set for one shipment sent to the shipper or consignee usually consists of three original and seven not negotiable copies. And one copy always has at least two papers including one of the contract details and the other of general terms. Then, it might consume at least 20 papers per each set for one shipment. Sometimes, there are big project shipments transporting to two different discharging ports, which means two separate sets of documents would be required. Consequently, the number of papers in use would increase double. Consequently, it is not sustainable that wasting that huge amount of paper while digital solutions have been available to solve this matter. Moreover,

the time spent for waiting for confirmation for the final draft of the Bill of Lading before signing, document delivery by post and wait time in between steps. The most significant wait time is document delivery by post. Besides time, the cost of post-service takes a particular percentage of freight rate depending on the distance and post-service provider's prices. There is someone, clearly takes responsibility for activities, for instance, preparing document draft, printing, stamping, sending documents. Even though these tasks would not take so much time, it still makes people schedule for all events in order to ensure productivity and efficiency.

The other problem which can be concluded from above is the speed. In sub-chapter 3.2.2. Ocean Bill of Lading Process, the process is described as a long, sequenced flow. In practice, the process is more complicated as the Bill of Lading must match with the other documents such as Manifest and Mate's Receipt which are always available once loading completed. Hence, the time from preparing the original Bill of Lading to presenting at the discharging port is normally around 1 - 3 weeks depending vessel voyage and agreed schedule. Consequently, sometimes the carrier must deal with time pressure to present the document on time at the destinations, but this relies on the courier service and schedule partly.

Moreover, after issuance, sometimes the documents need to be amended according to shipper's or consignee's requests, or due to unfortunate discrepancies and/or input mistakes. Then, the inaccurate set of documents ought to be returned to the carrier or carrier's agents before issuing a new one due to the document values. It is totally forbidden to have more than one set of original Bill of Lading circulating as whoever holds the papers would have ownership of the mentioned cargo. And the time to deliver the official document to the consignee is prolonged that creates delays in endorsement and discharging cargo. In the worse scenario, the demurrage and other related costs might be charged. It is always noted that all amendments have to be checked with all related parties regarding legal issues.

However, it is more harmful to all parties if the Bill of Lading is a fraud. There are many reasons leading to a fraud of Bill of Lading such as purposive intention, careless or typo. No matter what the reason is, the one holding fraud can have rights to request payment or cargo; and the person issuing fraud documents can be blamed for criminal deception. Clearly, the consignee would not receive the exact cargo, the carrier would not fulfill the consignment of shipper or transport to the wrong receiver, et cetera In some specific cases, the carrier is liable for any occurred damages and losses.

In addition to all discussed problems, delivering such important documents by couriers is insecure at a certain level. A missing document circulating in the market causes a lot of troubles. The carrier cannot issue a new Bill of Lading then the shipment would not be finished. No cargo can be released to the consignee without the Bill of Lading. Besides, this certainly causes delays in endorsement, cargo releasing and other next steps to complete the shipment that brings on later poor outcomes such as demurrage, extra costs or contract compensation. As well this might concern to legal issues.

Relied on the development of technology, the logistics association now can choose other options to handle important documents known as a digital version, particularly for the Bill of Lading is the electronic Bill of Lading. Intending to avoid unexpected events and losses due to listed reasons, it is about time to implement a new method for working with the Bill of Lading.

Following is the comparison table between paper and digital version of the Bill of Lading.

Table 6. Traditional Bill of Lading versus Electronic Bill of Lading

	Paper Bill of Lading	Blockchain-based Electronic Bill of Lading
Amendment	Difficult after issuance	Easy
Archive	Paper storage	Cloud-based storage
Courier fee	Average 100 Euro per one shipment	No
Ownership transfer	Using courier service	Using a web app
Document transfer time (speed)	3 – 10 days	Minutes
Security	Possibility of missing or being stolen document	No possibility of missing or being stolen document

The comparison table clarifies the differences between the two types of documents. The advantages developed from the technology of digital documents could be considered as influencers hitting right to the pain points of the company now.

7.2 Company Electronic Bill of Lading Adoption Process

In general, there are five major steps implemented so as to adapt to use electronic Bill of Lading:

- Define the needs of e-B/L: Determine the main problems negatively affecting the company.

- Determine pilot project scope: Draw limitation for the pilot project and set the goals.
- Choose a suitable service provider: Implement the provider selection process to have a suitable provider.
- Set up a pilot project: Contact all involved parties to reach an agreement for the pilot project.
- Evaluate outcomes: Implement project and evaluate outcomes based on set goals.

Below is the figure that briefly describes the process:

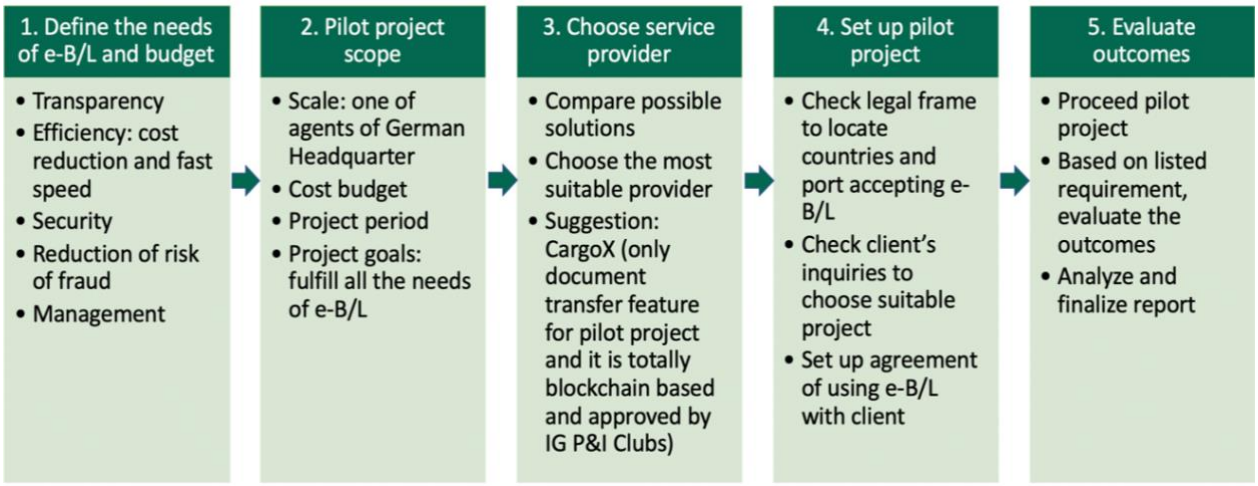

Figure 8. The overall process of adopting electronic Bill of Lading

7.2.1 Define Needs of Blockchain-Based Electronic Bill of Lading Platform

The first step is to acknowledge the necessity of e-B/L that is explained in the sub-chapter 6.1 above. Even mentioned current problems are truly pain points of each agent and headquarter, a more urgent matter which boosts the change of traditional Bill of Lading has popped up since the second quarter of 2020. That is the COVID-19 pandemic which forced the society to keep a certain safe personal space, limit contact with the others, switch to work from home and shut down numerous places. Every business has been affected differently, but all physical contacts and meetings are advised to limit as many as possible. Hence, issuing, sending paper Bill of Lading by courier to shipment destination and endorsing document to release cargo might be delayed which has a negative impact on every party. Besides, data thieves and hackers are taking advantage of the complex market to get benefits. Then, using a digital platform to transfer the electronic Bill of Lading that not only solves four listed problems, but it also is the most suitable and secure approach to deal with the pandemic situation currently.

To wrap up the conclusion, the following goals are set to achieved after bringing e-B/L into company practice: transparency, efficiency both in cost and time, security enhancement,

risk of fraud reduction and customer service improvement. After suffering the urgent pandemic, the company has more motives to implement blockchain-based e-B/L.

7.2.2 Pilot Project Scope

The next phase is determining the pilot project scope. As the company's headquarter has offices in 12 countries and agents in over 20 countries, allowing one of agents to test the e-B/L is the most possible. The thesis writer is working for Finland agent named SAL Heavy Lift Finland Oy, in short, SAL Finland, then this agent is a convenient and suitable option. There is no specific cost for using e-B/L, but it should be less than the current fee used for the Bill of Lading. Because the time of shipment varies depending on the client's requests and vessel availability, it is highly recommended to start the pilot project of e-B/L in quarter 3 2020 as earliest with available inquiries which are in discussing contract Charter Party phase. The shipper – carrier's client and the consignee – cargo receiver must also use the digital platform to transfer the ownership of the document, hence the agreement of using e-B/L ought to be valid among involved parties. It could be understood that the shipper and consignee need to agree with e-B/L then the pilot project would be implemented.

7.2.3 Platform Provider Selection Process

After clarifying the demands and requirements of the company, the next phase is digital platform selection. There are some popular platform providers with successful pilot projects such as Bolero and essDOCS. However, these are the first generation of e-B/L platform provider starting around 10 years ago. At the moment, the new generation which utilizes blockchain, specifically Smart Contract function has been impressing the Logistics community by upgraded innovative solutions. The navigator of a blockchain-based platform for transferring documents is CargoX with Smart B/L solution for the Logistics industry. Besides, TradeLens and essDOCS are integrating blockchain into their platform to create more solutions for users, but they are related to finance mostly. Due to the company's priority of security, while selecting the platform, the blockchain-based platform is one of the key requirements. As the first generation of e-B/L providers which mainly operate web-based cloud platforms, still must deal with cyber risks.

Because there are not too many available platforms for transferring title documents and most of them use blockchain technology or integrate it to upgrade solutions, creating a table of all platform providers would provide a general view of choices. Based on the Dickson's supplier selection criteria table below, four following criteria are considered as major factors to choose platform provider: quality, performance history, warranties and claims policies and price. The method of choosing a provider is elimination. Because the

product, in this case, is the end product, hence the selection process is simpler than the Monczka's process. According to company requirements and priorities, the range of choices would be narrowed down one by one, then the "request for quotation" phase could be executed to gain details about providers. After that, a table of comparison should be built containing all essential demands for the platform to point out the most suitable platform supplier. Once identifying the final expected provider, contacting and negotiating phase would be executed to reach an agreement.

The following table presents bidder's list based on general needs from the company:

Table 7. Preliminary Platform Provider List

Number	Platform provider	Platform name	Technology
1	Bolero	Galileo	Web-based cloud platform, integrated with the back-office system and online portals
2	CargoX	Smart B/L™	Public and neutral blockchain Ethereum network
3	Global Share S.A.	eDoxOnline	Web-based/private blockchain platform (integrated API)
4	essDOCS	DocHub and eDoc Exchange (DocEx)	Web-based cloud platform, integrated with blockchain for trade finance application
5	E - Title	E – Title ™	Peer-to-peer platform connected to a back-office system by an Application Service Provider (API)
6	TradeLens – joint of IBM and Maersk	TradeLens	Permissioned blockchain and neutral Hyperledger Fabric network (integrated open APIs)
7	WaveBL	Wave	The private blockchain web-based platform

Because of the key requirement of the blockchain-based application and the focus on transferring Bill of Lading only, the list would be narrowed down as below:

Table 8. Provider List Based on Key Requirements

Number	Platform provider	Platform name	Technology
1	CargoX	Smart B/L™	Public and neutral blockchain Ethereum network
2	Global Share S.A.	eDoxOnline	Web-based/private blockchain platform (integrated API)
3	TradeLens – joint of IBM and Maersk	TradeLens	Permissioned blockchain and neutral Hyperledger Fabric network (integrated open APIs)
4	WaveBL	Wave	The private blockchain web-based platform

The research phase was executed for all four platform providers based on the main selection criteria chosen earlier including: quality, history performance, warranties and claims policies and fee charged account. Besides, the blockchain type was one of the mandatory factors as well.

The following table provided the overview of all four potential candidates:

Table 9. Comparison Table of Listed Providers

Criteria	CargoX	eDoxOnline	TradeLens	Wave
Quality	- Document transfer speed: under 1 minute - High level of security - Fully decentralized network	- Document transfer speed: under 1 minute - High level of security - Fully decentralized network	- Document transfer speed: under 1 minute - Very high level of security - Partially decentralized network	- Document transfer speed: under 1 minute - Extremely high level of security - Centralized network
Performance history	- In operation since 2018 - The project with G2 Ocean shipment from China to Peru reviews: "the power of a modern, reliable, and efficient tool." (G2 Ocean 2019.). And there is tension to scale up the scope of using the platform. - Remarkable awards: won #DataccioConnect Blockchain Innovation, listed in hot 202 FreightTech 100 companies, voted Most Innovative Solution 2019 and best Blockchain Innovation of the Year 2019 at the Transport & Logistics Middle East, et cetera	- Incorporation of blockchain to the platform since 2019 - The project with Louis Dreyfus Company shipment from Paraguay to Parana reviews: "successfully executed using edoxOnline eBL" (Global Share 2020.)	- In operation since 2018 - Project with Pacific International Lines (PIL) shipment from China to Singapore reviews: instantaneous document transfer, automated document handling leading to a significant reduction in document process. (The Maritime Executive 2019).	- In operation since 2016 - The project with DSV shipment from Israel reviews: "Streamlining processes, shortening working times and reducing costs, and allows for minimal use of resources and expenses in documenting" (Haama Group April 2019.)
Warranties and claims policies	- Approved by the International Group of P&I Clubs - Cyber risk insurance	- Approved by the International Group of P&I Clubs	- Waiting for approval of the International Group P&I Clubs	- Approved by the International Group of P&I Clubs
Fee charged account	The document issuer would be charged for transaction fee	Free for carrier	The shipper would be charged for using the platform	Free for exporters/shippers and importers/consignees
Blockchain type	Public blockchain – Ethereum network	Public blockchain – Ethereum network	Permissioned blockchain – Hyperledger Fabric network	Private blockchain

After considering all options, the thesis writer comes up with the decision of selecting CargoX for the final providers according to elimination methods. Due to the following reasons, the author could have motives to select CargoX: type of blockchain technology, insurances and provider's missions. The performance of every candidate is certainly evaluated as good, efficient and potential to build a long-term collaboration.

The first constraint is using blockchain technology because of transparency and document safety. Three types of blockchain are integrated into platforms in the selection list, including public, permissioned and private blockchain. These all even have some proper characteristics of blockchain, still maintain some differences. One of the most noticeable points is the network. While the public blockchain is decentralized that would allow anyone to join the network and no one has control over it, the private type is only a distributed database that all permissions of transactions are kept centralized to an organization. It means the restrictions of private type would support for privacy and approved internal identities. And permissioned blockchain is in the middle between the others. It has a pre-defined set of transaction types for particular users. Clearly, it is not fully decentralized as it is controlled by an association of members. Since the pilot project scope and the needs of the company, the preferred type is public blockchain which could support the convenience of the carrier's clients and partners. Furthermore, with the public blockchain, once validated the data cannot be changed or modified.

The other factor considered when narrow the selection list is insurance. Three out of four candidates have been granted approval by the International Group of P&I Clubs that provides liability cover (protection and indemnity) for most of the ocean-going tonnage in the world. Noticeably, the CargoX beyond has cyber risk insurance for its own. This is evaluated as an advantage of CargoX.

The final major motive of the final decision is the provider's mission. As the pilot project scope is limited for Finnish agent and SAL Finland aims to have a user – friendly, reliable platform for transferring documents and ownership securely. Even though all candidates offer this function, but CargoX mainly focuses on this mission that they have defined their solution as a Blockchain Document Transfer platform. And they provide the IPFS storage which is distributed, secure and encrypted then data or information would not be centralized under any party.

7.2.4 Pilot Project Plan

The very first thing needed to be prepared is having the agreement of using the electronic Bill of Lading from shipper, consignee, agent for endorsement and releasement and other

relevant parties. After getting inquiries from clients, the company gives the best freight rates combined with the proposal of using the electronic Bill of Lading for indicated shipment. If the client satisfies the quotations and moves forward to building a charter party contract, there are two options to proceed with the shipment project, consisting of using a paper Bill of Lading and electronic Bill of Lading. SAL Finland, in this case, is the carrier, would be charged for the platform transaction fee to transfer documents and ownership. Additionally, today many countries and areas have been accepting the electronic Bill of Lading without any legal restrictions. BIMCO – the world's largest direct membership organization for shipowners, charterers, shipbrokers and agents has also supported for electronic Bill of Lading. Hence, it is not so difficult to persuade other parties to proceed with digital documents, except one notice while handling e-B/L that is provisions of the e-B/L Clause compiled in the BIMCO Clause with the function as the evidence of accepting using e-B/L.

The next step is requiring all involved parties in pilot shipment to register to the CargoX platform. Registration is free of charge, fast and easy-to-sign-up. The fee is only charged for implement transfer documents and ownership to the carrier. Depending on document types, there is a price list indicating all prices of each document. Then, instructions on using the platform should be given to all.

Finally, the pilot shipment could be executed according to the signed charter party. The digital Bill of Lading would be created, transferred and endorsed via the CargoX platform, then stored in IPFS – InterPlanetary File System up to 10 years that can be tracked any time by the audit log function of the platform. In the worse scenario, if any obstacles are suspending the electronic Bill of Lading, it is always possible to switch back to the paper document.

7.2.5 Outcome Evaluation

Once the shipment project is completed meaning the document is endorsed, cargo is released and payment is executed, a survey to evaluate the whole process should be executed. The target of the survey is three main parties mainly dealing with the Bill of Lading, including carrier, shipper and consignee. Based on the requirements set in sub-chapters 7.1 or 7.2.1, SAL Finland can compare the pilot shipment with traditional one by following factors: speed, costs, shipper's and consignee's satisfaction, convenience and occurred limitation during shipment. There is no evaluation for document safety as it is proved that using blockchain is much more secure than courier delivery.

With the survey result, the company can analyze the pros and cons while using the CargoX platform and the client's intention of working with e-B/L. Subsequently, the company would decide on handling the electronic Bill of Lading for other cases.

7.3 Electronic Bill of Lading Flow

The following flow chart presents the whole process of e-B/L with all involved parties while using the blockchain-based platform.

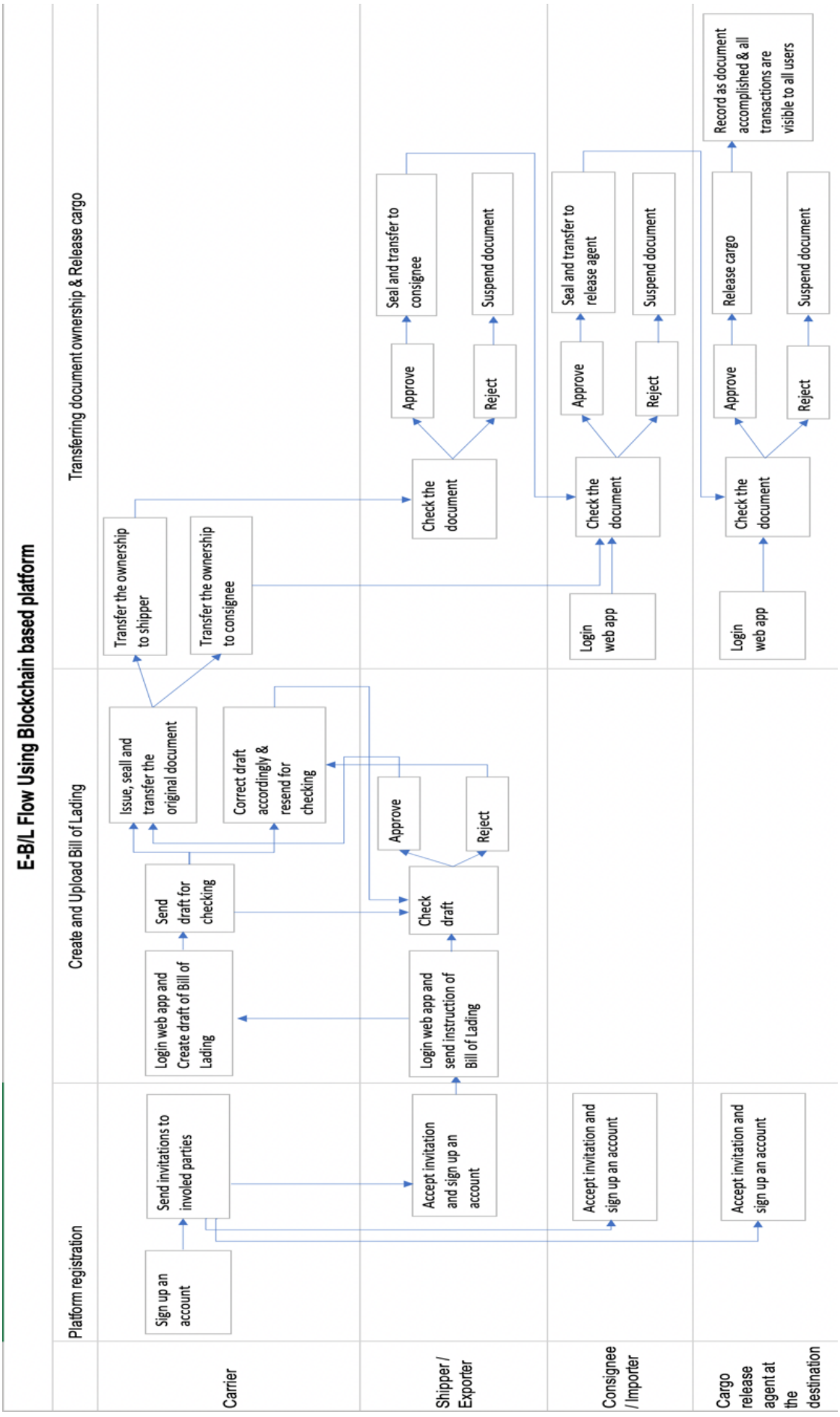

Figure 9. Electronic Bill of Lading Flow via Platform

While using the CargoX platform, SAL Finland can invite the other parties to join and contribute to the network. With the invitation, shipper, consignee and related others easily sign up own accounts for working with the digital document. There is no registration fee charged to any participants even carriers. To start the whole process of the Bill of Lading document via the platform, the shipper needs to log in to the platform and exchange the instruction for a document via communication function. Then, the draft of the Bill of Lading should be created accordingly and sent to the shipper for checking by the carrier. Once the draft of the Bill of Lading created by the carrier is approved by the shipper, SAL can issue the original document then upload it on the platform for transferring. Otherwise, recognized errors ought to be corrected appropriately until the draft is good to continue. To transfer the ownership of the document, the carrier simply composes an envelope attaching the original Bill of Lading and any other necessary important documents, then seal it. Finally, use the blockchain key to send the sealed envelope to the receiver who is either shipper or consignee by clicking transfer and input the blockchain key. Once this transaction completes, the ownership holder at that moment is changed to the envelope receiver. Similarly, the shipper would check the original Bill of Lading and forward it to the consignee by using the shipper's blockchain key to validate the transfer transaction if all is clear. Otherwise, the original Bill of Lading would be suspended, and the switch Bill of Lading might be issued to continue the process. Correspondingly, the consignee would execute the same transaction to transfer the document ownership to the release agent who is chosen by carrier in the beginning while composing the first envelope. In the end, the release agent would check the document, endorse it if nothing is suspicious and release cargo to consignee accordingly. And the platform would record as document accomplished to the system to close the shipment project. During using CargoX, all transactions are recorded on the system and can be tracked or traced any time via the archive folder. Users can check the current holder of document, actor and target of each transaction and exact actions implemented by actors. This is considered as the proof of transferring document ownership since all records are immutable, transparent and encrypted on the blockchain.

8 Discussion

This is the final chapter which provides recommendations for further research, summarizes the key findings of the thesis, collecting feedbacks from the commissioning company and is finalized with a reflection on the writer's own learning from the whole thesis process.

8.1 Recommendations

Though the thesis outcomes are produced for one pilot project shipment and used for the company in Finland, it is completely possible to scale up and expand the scope of the project. Moreover, the target of thesis research is the Bill of Lading, but the research process and suggested platform are also applicable to other kinds of title documents. Due to the huge capability of blockchain, it is not limited to transfer ownership but also proceed payments that is much related to financial technology – fintech being trendy for recent years.

Firstly, the company is able to test the digital platform as registration is done and some free credits to pay for transactions are valid up to 3 months. Hence, the company can issue a digital document for more shipments consigned from all clients who accept it. Successful document transfer cases will create a motive for other agents and offices of headquarter to use the electronic Bill of Lading depending on local legal restrictions and demand. In addition, it is not limited to transfer only Bill of Lading, but other important documents can be transferred such as charter party, manifest, mate's receipt, final packing list, invoice, et cetera Because the main research of thesis is Bill of Lading, so theories of other documents are not discussed deeply.

Since the thesis only provides a pilot project plan and builds implementation processes, once the projected shipment is executed, the commissioning company could have the real data of the shipment results. Eventually, the company could calculate the ROI – Return on Investment which reveals the efficiency rate. Relied on real data, the company would analyze the potential of scaling up the pilot project afterward. When the scope of the digital platform to handle the document of title is expanded both horizontally and vertically, the company and headquarter could gain enough data to measure the influence of moving to digitalization for the overview. The basic formula to calculate ROI is as below (Chen 2020).

$$ROI = \frac{Current\ Value\ of\ Investment}{Cost\ of\ Investment} - 1$$

In addition to profit and data security improvement, moving to digitalization could boost customer service and enhance the management capability which are the long-term profits that the company would likely gain without intended purposes. The thesis content does not include a detailed discussion about these benefits since it focuses on solving the current key pain points of the company with the document process.

The other suggestion for further topic development is to utilize blockchain technology to support banking transactions. Blockchain characteristics enable users to trade digital currency, for instance, Bitcoin is considered as the first and largest cryptocurrency. And Ethereum is similar to Bitcoin but much more user friendly. With these types of currency, the double-spend problem would be solved that creates an advantage for the finance industry. Using cryptography currency would eliminate a trusted third party, usually banks who joins transactions among parties to keep a ledger verifying every digital cash portion was spent only once (Swan 2015). Regarding payment process between shippers and carriers, according to Mr. Strommen, if all parties related to a shipment project decide to use blockchain-based electronic documents web app to proceed with the payment, there is no demand for banks to confirm the payments. Even though this approach is out of the thesis scope, the company can execute further researches about fintech, relevant legal issues, et cetera to extend blockchain technology usage assisting company business flows.

8.2 Key Findings

The key findings of the thesis report were covered in every project task, consisting of the theoretical framework, the analysis of qualitative data, the supplier selection and the document flow chart.

Firstly, the thesis - relevant theory concepts were briefly defined in sub-chapter 1.7, and each was clearly explained in detail in the following chapters. In the beginning, the knowledge of the Ocean Bill of Lading, including document functions and flow was emphasized. This is defined as a document of title, some noticeable legal issues related to ownership were also discussed. As the digitalization was the thesis outcome approach, the electronic Bill of Lading concept was introduced shortly due to the equivalence. And blockchain has been a trending technology for assisting all kinds of transactions that is thesis topic. Hence, the blockchain concept and its applications, especially in transferring documents were presented. Besides, the blockchain-based platform was recognized as an intangible product, the backgrounds of intangible and supplier selection were studied as well.

Relied on qualitative data collected from an interview with commissioning company and case company – G2 Ocean, the needs of transferring to the digital document were explained and the benefits which would be achieved were emphasized as well. Digital document is not a new concept, but blockchain technology integration into existing tools could bring advantages solving many obstacles of digitalization such as cyber risk and belief. As stated earlier, digital platforms used for transferring document has been operated for more than 10 years, and a lot of freight forwarders, shipping companies, port agencies, other companies acting as the shipper in Bill of Lading and custom authorities have been joining to work with electronic documents. For instance, ONE, CMA CGM and Maersk are top popular logistics companies who are experiencing electronic documents, even partnering with technology companies to develop their own digital solutions. One of the most well-known cases is Maersk. They have built the TradeLens solution with IBM in 2018 that applies blockchain to the global supply chain and logistics. Or essDOCS, it was established in 2005 to assist digitalization, but until recent years, it has been updating solutions by utilizing blockchain with the aim to expand the user categories and capabilities of solutions. In conclusion, the blockchain-based solution would bring more benefits and security than EDI – Electronic Data Interchange based applications which are mostly used for the first generation of digital platforms. For the general definition of EDI, it is the electronic transfer of data in a standard format among multiple computer applications without human intervention (Sharma & Sharma 2012, 233.). However, the thesis topic determined the application of blockchain into the document process, so EDI theoretical framework was not included.

As the thesis proposal was a pilot project shipment executed with chosen a digital platform, then the provider selection process was one of a part of the thesis. The digital platform could be seen as a service product or an intangible product which is usually evaluated by qualitative factors as listed in Table 8. Though the supplier selection process theory is used for the materials or sources supplier selection in procurement, it is assumed to have the possibility of being adapted for end products. There are many criteria tables applied for the supplier selection process that had been established. However, there are no restrictions on using only one criteria table. Criterions from separate tables would be chosen to form a suitable one for the company, depending on company needs and problems.

The flow of the traditional Bill of Lading was referred and applied to create the main thesis outcome – the Blockchain-based electronic Bill of Lading process. The flow chart included all related partners who would join the chain to implement the whole pilot shipment. And the stage of handling the Bill of Lading was divided into three steps. The flow chart of the

Bill of Lading presented relationships among parties as well. The chart can be created by many tools, but the author chose Excel as it is user-friendly, fast and default on the laptop.

8.3 Feedbacks of Company

The final project task is company feedback collection and evaluation. The thesis was presented at the company office in Espoo, Finland to the Managing Director. A screenshot of the presentation material was added as appendix 3.

The thesis was commented as an interesting topic as it was agreed that "blockchain technology could be the way forward for doing most of our transactions within shipping. Bill of Lading is an obvious place to startup" by the head of Marketing and Corporate Communications.

Besides the thesis content, the platform demo instruction was also presented to explain deeply how to use the platform. And the Managing Director was fond of the electronic Bill of Lading flow that emphasized the difference when using the digital platform. He also discussed the possibilities of the pilot project. Eventually, the conclusion that deeper researches related to legal frame and restrictions could be checked with the law department of headquarter to ensure single terms and conditions agreed in the contract with clients. Though, the pilot project had no obstacles with general laws and rules. Since this was more relevant to law specialization, there was no theoretical framework or further discussion included in the thesis content.

The recommendations were presented as well. And the one indicating about payment transactions created an interest in the presentation audience. Similar to the legal matter, this one could be also expanded into financial technology research for further development.

In general, the thesis outcomes were satisfied by the company representative and opened more new possibilities to develop further researches and applications.

8.4 Reflection on Learning

Conducting this thesis project had allowed the author to acquire the primary background of the global marine logistics industry, the document flow of marine shipping, particularly the Bill of Lading and process management. In addition, the basic knowledge of blockchain technology which is out of specialization program was obtained while the author was studying its characteristics and benefits. Even though the thesis topic was not so closely referred to the writer's specialization study, the knowledge of international

business, customer service and process management were key achievements that would be beneficial to her future educational and professional development. Especially, today technology and data management play important roles in international business and digital management.

Moreover, included in the thesis is the learning of the supplier selection process which supports implementing the project task. Analyzing the needs of properly selecting supplier, setting suitable criteria table and selection process were related to sourcing and supplier management theories. These are important parts downstream of supply chain management that is the author's major. Through writing this thesis, the author also had a chance to revise and flexibly apply her knowledge to the practical case.

Meanwhile gaining both business and technology knowledge, the writer also faced up some obstacles during thesis implementation. The first one was the blockchain study. Since technology is a new field for the author, it had taken time to look for reliable academic resources and understand many technology professional explanations for simple sufficient recap in the thesis. The other challenge was getting the true experience with the blockchain-based platform. There was the ability to send a demo request to each platform provider. However, since it would consume many resources of them, the platform demo was only supplied to potential users rather than for thesis purpose. Fortunately, the Head of Marketing of commissioning company headquarter had put the author into contact with a shipping company who had experienced the blockchain-based platform for an online meeting. And then, one of the platform providers who was also the suggested solution of the thesis had offered a meeting to explain their solution. Lastly, due to sudden urgent pandemic, it was difficult to communicate via emails and set up online meetings with company representatives since everyone needed to work from home.

In general, working on a cross-functional thesis was admittedly challenge, but an amazing chance for the thesis writer to revise own learnings and expand her knowledge as well as limitation. Moreover, different skills were developed by conducting this thesis project such as qualitative data analysis, building process and project management. Having had an opportunity to get a blockchain professional to explain its concept would help the writer understand the incredible capability of technology tools in many perspectives. It could be supply chain, finance, marketing or even human resources. The other remarkable value of this thesis was the understanding of the connection between supply chain and logistics, as well as the importance of building process. Finally, the thesis project was a solid experience in dealing with a business problem. This would provide the author with professional development possibilities related to the topic and more opportunities to grow in actual working environments.

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Appendices

Appendix 1. Commissioning company Interview Questions

1. What is the revenue/profit figure of SAL Finland and SAL GmbH?
2. From the company's point of view, what are the roles of the Bill of Lading in the general shipping field and to the company specifically?
3. How much importance does the company consider the Bill of Lading role for shipments and company?
4. From the company's point of view, what are the main problems with the current type of Bill of Lading documents? Time-consuming/costs (manual work, paper, document delivery, et cetera)
5. How much does the personnel cost (office operation) account for in total cost? And how much does the paper cost?
6. How much time does document delivery usually take?
7. Concerning legal terms, what are the main points related to BL that the company needs to pay attention to during issuance?

Appendix 2. Material Case Company Interview Questions

1. From your point of view, what is Blockchain?
2. What technologies does Blockchain-based on to apply for electronic BL? (Distributed Ledger, PKI – public key infrastructure, cryptographic signature). Could you introduce and explain in detail the BDTS system? (Blockchain Document Transaction System).
3. Could you describe briefly the documentary process while using electronic BL?
4. What are the pros and cons of electronic BL?
5. What are the differences between exchange emails for creating BL and using the e-BL platform?
6. Are there any difficulties with implementing electronic BL? How about legislation and standard terms?
7. How the endorsement would be implemented if using Blockchain to transfer ownership? Endorse paper via platform also?
8. What changes do you think electronic BL would bring to logistics or shipping or supply chain areas?

Appendix 3. The Thesis Presentation PowerPoint Material

Appendix 4. Thesis activities timeline as a Gantt chart