

Solution for Innovation in Order Management Service & Freight Forwarding
B2B Blockchain-powered EDI Communication Solution

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Abstract <p>The study was assigned by Expeditors, which is one of the leading global logistics providers offering a full range of forwarding and supply chain solutions. The freight forwarding industry has seen a competitive scenario due to continuous investments in innovation. Only a strong player with ambitious development plans can drive ahead the competition.</p> <p>The objective of this study was to propose a possible solution for improvement in the information business of the freight forwarder by deeply and thoroughly delving into one of its data-intensive departments (Order management department). The study aimed at contributing an idea to the company's continuous innovation and development strategy with an ambitious solution.</p> <p>The study was implemented by applying the qualitative research approach to data collection from a one-on-one mentorship, in-depth interviews, material collection and on-site work experiences. The data was analyzed and reorganized to answer the key research questions supporting the outcome of the study.</p> <p>The research process started by navigating highly recommended areas for improvement through benchmarking. Understanding order management and the existing procedural inefficiencies facilitated narrowing down the development areas to the most promising focus points. Further analysis was conducted in order to suggest a sound solution with the improvements and challenges considered.</p> <p>As a result, a blockchain-powered EDI data-sharing platform was suggested as the possible solution for future development in the information business of Expeditors. The solution was a combination of leading technologies which helps automate and optimize critical business processes.</p>		
Keywords/tags: Expeditors, freight forwarder, order management, standard operation procedure, blockchain technology, EDI data transmission, inefficiencies, B2B communication solution.		
Miscellaneous		

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Terminology

LSP	Logistics service provider
OM	Order Management
SOP	Standard Operating Procedure
EDI	Electronic Data Interchange
B2B	Business to Business
B2C	Business to Customer
PO	Purchase Order
FCR	Forwarder's Cargo Receipt
COB	Confirm on board
L/C	Letter of Credit
SI	Shipping Instruction
BOL	Bill of Lading
SRM	Supplier Relationship Management
SCM	Supply Chain Management
DLT	Distributed Ledger Technology
OMB	Order Management Booking system

1 Introduction

1.1 Preface

The market is continuously becoming more and more competitive in all industries, and this requires every company to grow and improve day to day in order to stay in the competition and ahead of their rivals. Companies do their best in focusing on core competency, innovation and driving for efficiency. As a result, companies tend to out-source activities which are supporting parts along their main business to outside parties. The fact that many organizations have been strategically leaving their logistics and supply chain management parts into the hands of professional logistics service providers and it has built up a Logistics outsourcing market that is worth over hundreds of billions of dollars in the United States and Europe (Grant, Trautrimis & Wong 2013, 12). This study has been developed on the background of an optimal solution that could help companies in expediting and managing purchase orders from foreign vendors in an effort of ensuring commitment and increasing visibility through the upstream supply chain.

Buyers in international trading might face several challenges in managing their upstream supply chain partners due to language barriers, different cultures, time zones, different regulations, shipping processes, long distances, delays in situation updates, rates of commitment, unpredictable disruptions and much more. Mutual trust could not be a complete answer to those problems. An additional party is needed in this case and this is no one else but a logistics service provider with an optimal solution to help the buyer in managing vendors in sourcing origin and successfully forwarding shipments to the right destination on time in full and in excellent condition.

It is no exaggeration to state that this is a promising market for logistics specialists to join, but this is surely not easy if the specialist only handles the normal shipping

process. The “order management” term is normally familiar to sellers and/or buyers in international trading, and a freight forwarder is primarily responsible for the shipping process as booked by the client. However, the term “order management” could be transferred to a logistics service provider (LSP) as a value-added service so that the LSP can collaborate with vendors in the sourcing country and help buyers in literally managing purchase orders until they are committed and ready at the destination’s warehouse with end-to-end visibility. Additionally, logistics service providers with their broad networks of offices and branches geographically around the globe could help customers in managing suppliers and follow-up every purchase order in the local context and have them updated with any delay or problem with the shipment. Moreover, a logistics service provider can achieve better freight rate from the carrier for their customers thanks to the economics of scale and their big forwarding volume. The order management team could participate in the game as middleman who represents the buyer in the sourcing location and helps manage the purchase order data down to the item level and arrange shipping at the container level. By this, the buyer can be guaranteed that the purchase order (PO) is successfully expedited before the vendors could obtain the payment accordingly. With the order management service, the LSP can help their customer reap various benefits which are fully analyzed and presented in this study.

This research was carried out to carefully study the market segment and potential target customers and similar services offered by Expeditors’ competitors in order to verify the demand of an order management service. The process consisted of benchmarking, analyzing inefficiencies in operating procedures and seeking improvements. According to WTO, 90% of goods in cross-border trade reach their destinations by maritime transportation, so that this research concentrated on the ocean shipping mode and its requirements.

1.2 Host company and thesis topic

This study was assigned by the Expeditors company which is in the top 5 of leading global logistics service providers. It was founded in 1979 in Seattle, Washington, The

United States of America with a broad network of 322 branches located in six continents to serve their customers in the shipping and supply chain management industry. Their core services include supply chain solutions, freight forwarding, customs clearances and other such services. Among those, order management service is one of the most unique value-added services of Expeditors. This service help customer in mapping the supply chain and managing both upstream and downstream partners. The company is seeking continuous development idea to upgrade the service and boost efficiency in its everyday operations.

The author developed an interest in making a contribution to the development strategy of the company with a solution related to technological and procedural development. The order management service's operation was chosen to be the background of findings. Despite of that, the research objectives were not expected to limit to the development of Order management service only, but also the whole operation of freight forwarding business. The research topic was discussed with the company's district manager, and the author was encouraged to proceed with support from Expeditors' agents.

1.3 Problem statement

Order management has become one of the most unique departments of Expeditors with its state-of-the-art supply chain solutions for their customer with a wide range of offerings and tailored added services. However, in order to lead the competition, Expeditors should never be relaxed in seeking continuous improvements. The expectation of a development idea to improve the order management service procedures and innovation was the motivation of the study.

Expeditors is one of the most competitive logistics service providers in the world, and they have been offering the "order management service" successfully. Despite its worldwide geographical coverage, the biggest share still comes from the United States and Canada. There are also many giant competitors who grab considerable market shares. That fact raised a question of what and how Expeditors could improve in their

procedures in order to drive for efficiency and innovation, and as a result, to lead the competition worldwide. There are competitors who also offer customized or similar services in the field, which raised the importance of doing market research and benchmarking. Doing benchmarking with the current biggest competitors is able to not only provide a review on where the company is in the competition, what make it stand out, but also suggest promising areas for further innovations and improvements. Simultaneously, understanding of the current operating procedures help in navigating and reasoning inefficiencies in order to narrow down the areas and prioritize the area of focus. Only by tackling all the inefficiencies with comprehensive solutions, can an enterprise be able to drive ahead the pack. Blockchain technology has been studied to suggest applications for OM's procedural improvement. However, understanding blockchain technology is one of the biggest issues before studying how it brings improvements.

Therefore, in an effort to maintain and expand the customer base for the OM service in this challenging competition, researching and improving should be taken as the top priority. In short, the study was expected to provide full information of the service at the moment, point out rooms for improvement and hopefully be able to attract potential customers to Expeditors' OM service with an ambitious solution for innovation.

1.4 Objectives

This study aimed at seeking a solution to the existing identified inefficiencies in the operating procedures of order management, which was the main objectives of this research.

The research questions of this study were as follow:

1. What is order management service and what is the key area for development after doing benchmarking with competitors?
2. How to handle a shipment with the order management service from start to finish?

3. What are the inefficiencies in the operating procedures and what are their causes?
4. What could be the solution to address those inefficiencies? What are the improvements and challenges?

The research questions were raised in an aligned structure to support the research framework. By answering those research questions, it provides a logical process to implement and lead to the intended overall objective of the research. The idea development procedure was as follows:

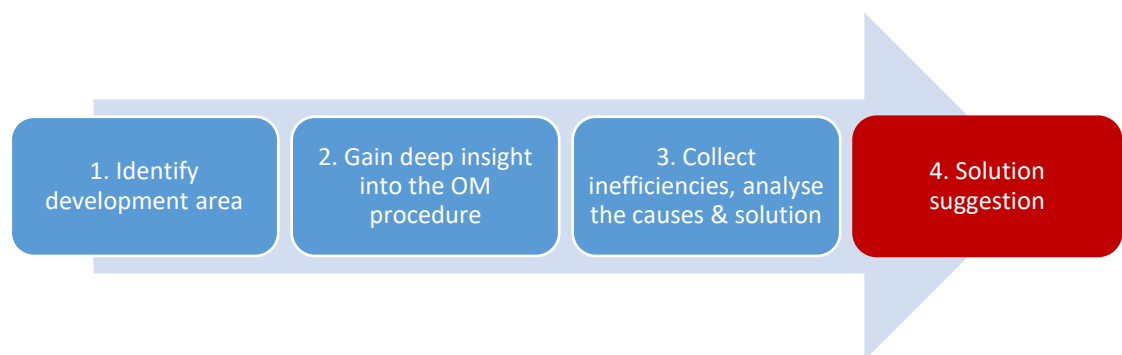


Figure 1. Research framework

Firstly, performing market research and benchmarking shall provide an insightful introduction to the order management service and also outline the key area which should be concentrated on in development strategies. Secondly, demonstration of Order management's standard operating procedure (SOP) facilitates comprehensive understandings of its step-by-step operation and party involvement which help perform the cause analysis for the identified procedural inefficiencies. The collected data about inefficiencies reveals the key problem in existing system and based on that, the development area is narrowed down for better focusing. Finally, the outcome of the research is to suggest a solution to drive for efficiency and innovation.

2 Methodology

In this section, two different research types “qualitative” and “quantitative” are defined in order to support the method selection for this research. After considering all the aspects affecting the research process and results, the qualitative research approach was chosen. Definitions of the two approaches and reasonings on the decision are respectively demonstrated in this chapter.

2.1 Qualitative research method

Qualitative research is the traditional approach to a new phenomenon on which there is a lack of available related theories, models or hypotheses. This method helps in producing answers for the question “what”, which is required for further consideration (Kananen 2011, 37.)

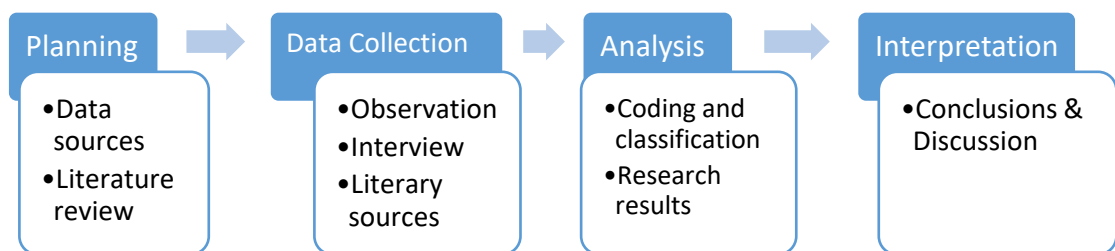


Figure 2. Qualitative research flow chart [adapted from Kananen 2011]

The above flow chart from Kananen (2011) provides guidelines for proceeding with a qualitative study successfully. Firstly, acknowledging which topic is suitable for this method is a fundamental step. With this method, the researcher is seeking, for example, possible solutions to a problem which has not been established or defined yet. In that context, the data collection stage should concentrate on collecting suggestions, ideas or opinions especially related to the raised issues. Those data are normally unmeasurable, and they suggest factors of a specific phenomenon. Generally, the qualitative approach helps improve understanding of the issue.

As the term implies, qualitative research does not concentrate on the number of cases examined but on selecting the research object. It is crucial to carefully choose the interviewees who are highly related to the phenomenon or the professionals who are working on the subject. By this, the data generated can be ensured to be up-to-date, accurate, reliable and complete.

It is widely acknowledged that the less information is available about a research problem, the more fit-for-use the qualitative method is. Trochim and Dolley (2008) have defined when this type of research is mostly recommended as follows:

- Research on an unknown phenomenon
- Research for deeper understanding
- Aim to generate new theory
- Combination of research methodologies
- Generating phenomenon description

In an attempt to make a good decision on research methodology, those situations mentioned above should be taken into consideration.

The selection of data collection methods plays a vital role in generating reliable and valid data for the research and ensuring the applicability of the research results to practice. As outlined by Marshall and Rossman (2011, 137), there four primary methods for data collection which are (1) participating in the context of the problem, (2) direct observation, (3) focused interview and (4) material analysis. The first method (1) is applicable when participating in a working environment where the problem arises. This method is highly recommended when the researcher is able to enter the real environment to seek the problem and its solutions. This method permits the researcher to experience the reality of the problem and record the core message of the need for the study. The second method, direct observation (2), helps in acknowledging the people in that context, their routines, procedures and requirements which can be transformed into valuable data for the research. Thirdly, the focused interview method (3) is fundamental for every qualitative study because it provides in-depth information and suggestions gathered from a group of interviewees who are affected by the phenomenon. Therefore, the stage of selecting the research object is of great

importance to ensure the quality of the collected data. Last but not least, material analysis (4) is a common way to collect data in qualitative research. Documents and materials can well-present in-depth data related to the topic or propose a supporting idea, suggestion or help the researcher to learn in the setting. Documents demonstrate data in an official written form which might guarantee the reliability and validity of the collected data. It should be noted when choosing this method that confidentiality agreements for the publicity of materials must be reached by the parties involved. The data collection methods should be considered and well-planned from the very beginning of the research process for the best quality of the data used for the research.

In short, qualitative research suits best for a topic with a lack of core information and requires concentration on professionalism towards the topic. The research process and data collection methods should be defined and designed in advance for accessibility to reliable sources of data.

2.2 Quantitative research method

Contrary to the qualitative approach, the quantitative method especially concentrates on a fairly well-known phenomenon with core theory available (Kananen 2011, 72). This method is suitable for statistically measuring data collected from a large number of examined cases with the same list of questions.

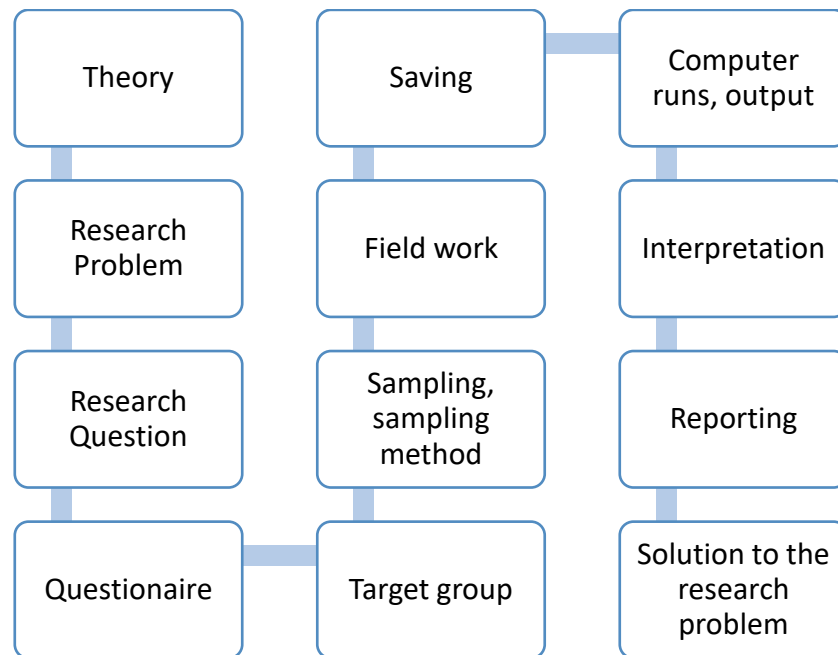


Figure 3. Quantitative research flow chart (Kananen 2011, 72)

Since the theory available and the phenomenon is clear, the research process starts at the stage of a problem statement which is then converted into research questions. Those questions are the main tools and instruments for the data collection stage. A questionnaire is provided to the target group who are concerned with the topic. This method requires a large number of researched cases in order to provide relevant data. By this, coincidence or bias in the answers can be hopefully avoided. The data is evaluated and sorted into groups for probability or non-probability sampling. The data is interpreted in order to solve the research problem stated at the beginning.

In short, quantitative research methods suit for a well-understood phenomenon which requires a large amount of data for answering the research questions.

2.3 Research methodology selection

Indeed, this research concentrates on delving into the operation in a professional environment in order to generate a new solution for improvements. After the two key concepts of qualitative and quantitative methodology were defined, the qualitative research approach was chosen for this study because it was considered to suit and bring valuable, reliable and valid data for solutions of the research problems.

The four qualitative data collection methods are appropriate and indispensable, and they can support the research with valuable ideas, comments and opinions from the professionals in the researched field. Since the study was seeking improvements in a professional working context of logistics field, there were several requirements for reliability and validity of the data. Firstly, the interviewees had to be people who were familiar with the practice and had adequate insights on the topic's background. Secondly, as the study aimed to seek procedural improvements to a service of a specific company, the limitation of data sources created a constraint for gathering a massive database from outside parties. Thirdly, the phenomenon was not well-known and understood by most of the target group. Lastly, the aim of this research was to suggest a new solution for a specific service, not evaluate or collect feedback on the existing objects. Therefore, the quantitative method was not considered applicable, while the qualitative method seemed more appropriate to pursue. Throughout this study, all four data collection methods were applied in order to fully explore the topic and provide complete information for improvement.

2.4 Research phases

The need for improvement was at the root of this study. The research process was well-planned in an attempt to reach the data sources that supported the study.

The data collection methods, the process and purpose of each stage are presented in Figure 3 below.

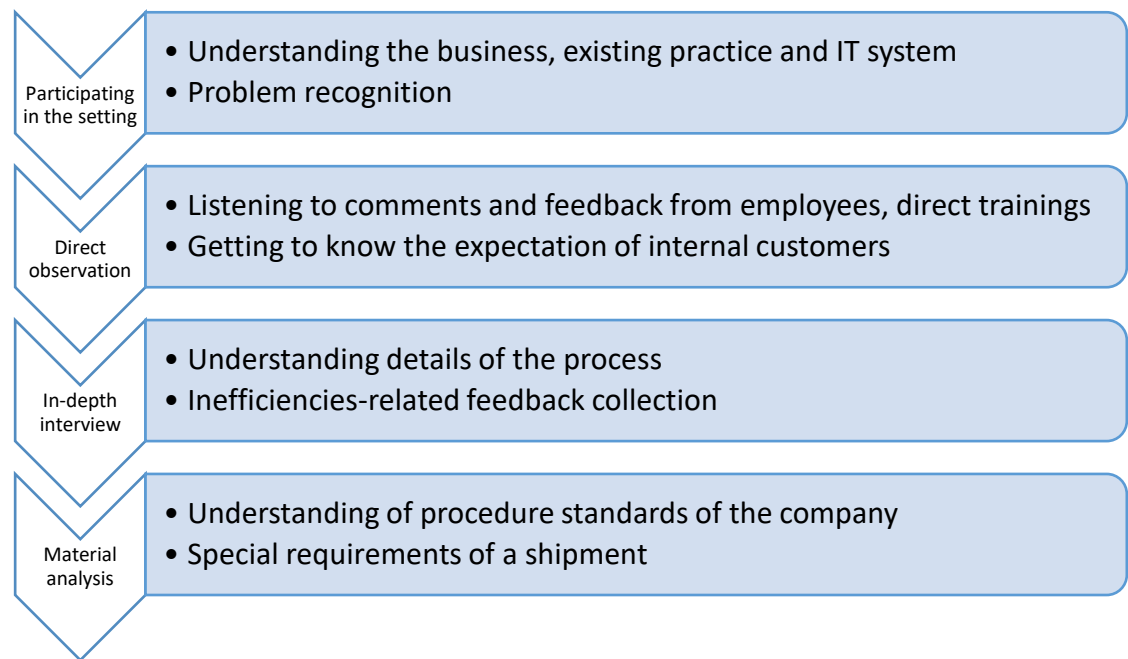


Figure 4. Data collection process of this research

The process started with gaining deep insight on the operation of the company in general and of the department in particular to record the first early signs of inefficiencies by self-observation. In order to do that, the “participating in the setting” data collection method was chosen. In the context, the author worked in the company as an intern in the OM department. Through direct contact with employees in the department every day, some inefficiencies in operation was highlighted, and comments and feedback from them were considered data in studying the need for procedural improvements. The next step was to have focused interviews with professionals, such as some of the employees who carried out the work in executive level, the managers for broader insights and the district managers for understanding some other constraints and resources for the change. Materials, such as shipping documents, current standard operating procedures or checklists were analyzed to support the study.

Simultaneously with the practical data collection, a theoretical framework was created in order to provide officially proved insights from books, professional journals and official websites that were considered useful for supporting the research. Additionally, in order to seek applicable solutions which could be fitted in the current working context, support from the host company was a big contribution. After all, service description and proposals for improvements were considered applicable and proposed as the research results.

3 Literature Review

All the key concepts which are connected to this research were presented in this chapter to offer the most relevant knowledge base for the idea development process.

3.1 Freight Forwarding

Freight forwarding were the research background and the objective of this research were to improve the operations in the context of freight forwarding industry.

3.1.1 Definition

Freight forwarding is described as the important role of logistics service providers who are responsible for organizing and handling shipments from the point of origin to the destination, by ensuring full compliance with the law and regulated procedures (Khandker 2013, 9). The International Federation of Freight Forwarders Associations (FIATA) has sent out an announcement towards the widespread adoption of an official description of Freight Forwarding and Logistics Services as follows:

"Freight Forwarding and Logistic Services" means services of any kind relating to the carriage (performed by single mode or multimodal transport means), consolidation, storage, handling, packing or distribution of the Goods as well as ancillary and advisory services in connection therewith, including but not limited

to customs and fiscal matters, declaring the Goods for official purposes, procuring insurance of the Goods and collecting or procuring payment or documents relating to the Goods. Freight Forwarding Services also include logistical services with modern information and communication technology in connection with the carriage, handling or storage of the Goods, and de facto total supply chain management. These services can be tailored to meet the flexible application of the services provided.” (FIATA, 2004.)

3.1.2 Functions

The process, paperwork and regulations involved in international or even domestic shipment are the primary responsibilities of the service called freight forwarding. Freight forwarding handles ancillary services, such as arranging shipping schedules, purchasing the freight insurance, preparing custom documentation and clearance, several other kinds of necessary document arrangements (bill of lading, invoice, certificate of origin...) or even including also assistance on packaging and labeling (Khandker 2013, 11-12).

It should be noted that a freight forwarder is usually not responsible for the physical cargo movement from the source to the proper destination (Crowley, 2019). Instead, they act as the central actors of communication and collaboration with the actual carriers to schedule the carriage and provide the link throughout the supply chain and shipping activities. Ocean liners, airlines, truck transportation providers or railway companies are those who performs the physical carriage of goods as planned by freight forwarders.

According to a forwarder’s ability and resources, their service offerings range from basic forwarding functions to specially-tailored supply chain management solutions. There are several common functions performed by almost every forwarder:

- Arranging types of transportation modals
- Scheduling shipments
- Quoting freight rates
- Booking space with carrier or transport companies

- Documentation
- Export/Import Declaration
- Tracking and tracing shipment
- Consulting terms of sale and payment
- Cargo consolidation
- Obtaining certificates and export licenses

Besides, advanced and customized services are often offered by larger freight forwarders, such as:

- Supply chain solutions
- E-commerce solutions
- Project management
- Logistics infrastructure design
- Logistics digital platform
- Tailored solutions for multiple industries

The more diverse services are that a freight forwarder can offer to their clients, the more competitiveness they have in the market. It is undeniable that business networks, geographical service coverage and intelligent information technology systems are of the great importance in the elements of a successful freight forwarding segment in cross-border trade (Edwards, 2019.)

3.1.3 Involved parties

There are various parties that are required to systematically participate in any one standard shipment in foreign trade. Each party has its own roles and responsibilities to contribute to the movement of cargo either physically or not, either internationally or domestically. The following figure gives an example of the primary actors who strive for the same goal of a successful shipment by a freight forwarder.

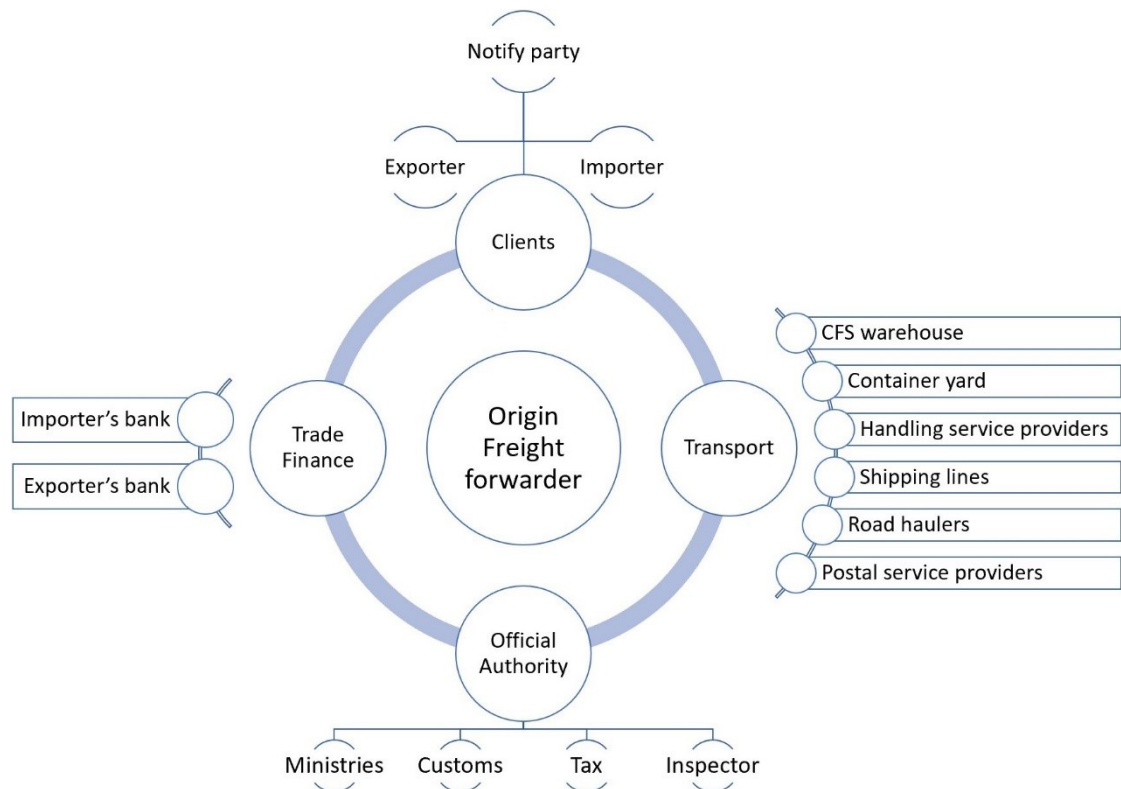


Figure 5. Shipping involved parties

The number of participants depends on several factors such as types of cargo, routing details, country requirements, payment methods, value-added services, law and regulations, sale terms and conditions. As reported by Maersk, 30 actors, over 100 human-beings and 200+ information and document exchanges were found involved in processing one refrigerated container of agriculture products from Kenya to the Netherlands (Ganner 2018, 17).

3.1.4 Issues & development trends

The utmost missions of any business are satisfying customer's expectation and continuously seeking improvement. There are two top trends in the freight forwarding industry these days.

❖ High demand towards customizable service

The development of shipping market has seen the higher expectation of customers from supply chain solutions served by forwarders. Increased

demand of high degree of customizability in logistics services creates a new playground for major freight forwarders.

The fact that customer expects service providers collaboration in their early stage of seeking and tailoring logistics solutions. As discussed in FIATA 2016 World Congress, customized value-added services are likely reaching top trendings in the following years of freight forwarding business (Conaty, 2016). This statement suggests one of the top priorities in the growth strategies of major players in the field. There is a general consensus that a wide range of customized service offerings help freight forwarders to achieve differentiation from their competitors and lead to new source of revenue.

Expeditors drives their business far beyond the future expectation by offering various customizable logistics services to their customers and remains their top position in the market. Order management service is one of their solution which is well-tailored per customers to strategically support their supply chain.

❖ **Seeking improvement in digital era**

Continuous improvement never loses its top position in any company's list of growth strategies. New technology adoption is a great suggestion for improvement and is often expected to drive efficiency in this fourth industrial revolution.

Indeed, this 21st century welcomes the evolution of digital world with the Internet of Things (IoT), Big Data, Blockchain technology & Artificial Intelligence (AI). Various researches were conducted in many industries to outline the potentials and benefits which those technologies promised to bring. Especially to freight forwarding whose operating procedure is recognized as complicated and intensive operation procedure, cutting-edge technologies are highly believed as the game changers. Embracing technology and digitalization can contribute to the development of scale and efficiencies of operations.

Particularly in this study, advanced information system powered by blockchain technology is suggested for efficiency improvement in labour-, paper- and information-intensive industry as freight forwarding. Reasons for the choice can be reached in the research result chapter.

The solution suggestion is considered following to these two development trends of the freight forwarding industry.

3.2 Procurement process in international trade

As indicated above, the order management is a function in the procurement process of a buyer's company. It can be outsourced to a well-known freight forwarder. Before answering to the question where OM service fits in the process and how it helps customer manage their purchase order (PO), it is worth getting to know the procurement process.

Procurement has been the key activity in several industries. Purchasing value usually accounts for over 60% of the cost of goods sold in manufacturing industry and up to 90% of that in retail industry (Mangan, Lalwani & Butcher 2008, 76). Procurement has been well-defined as the whole process from sourcing the right suppliers, placing actual purchase orders to managing and following up the delivery of the POs from vendors to company's designate location. The standard procurement process has been explained by Arjan Van Weele (2014, 8) as follows:



Figure 6. Procurement process (Van Weele 2014, 8)

✓ Step 1: Specification

In this stage, all the requirements of the products or services that the company wishes to purchase should be clearly indicated. They could be

quality requirements, technical requirements with clear drawings, functionality, logistics requirements, safety and reasonable budget, etc.

✓ Step 2: Selection

Selection step is primarily responsible for identifying the most preferred supplier(s) who meets the requirements to start the business with. The right supplier is the one who has been shortlisted with the most competitive offer and promising prospect of a long partnership.

✓ Step 3: Contracting

The two parties are now entering the stage of negotiating commercial terms and conditions for the partnership, discussing about how to do business with each other and the procedure of collaboration.

✓ Step 4: Ordering

In this stage, a purchase order should be placed on behalf of all agreements signed in the previous step to the supplier and purchase order number is recorded onto the system. The required shipping date of the specific PO should also be mentioned for supplier easier in organizing shipping.

✓ Step 5: Expediting

The buyer monitors, tracks and gets the PO delivery status update from supplier. To avoid mistakes, the buyer, in this stage, should be proactive and be ahead of the unexpected situation by frequently contact and update status with their supplier about a specific PO. This stage keeps the company from manufacturing mistakes, delivery mistake, late delivery, etc. This stage may last until the PO is confirmed on board or shipped to the buyer's premise according to the agreement before the buyer makes payment for the PO. There are 3 types of expediting practice discussed by Weele (2014, 8):

- **Exception expediting:** Actions are only taken when manufacturing or shipping problems occurred and notified by upstream partner.
- **Routine status check:** The buyer contacts supplier a few days for PO status check before the promised delivery date. This practice help keep buyer posted for any changes and also reserve some time for problem-solving.
- **Advanced status check:** The buyer frequently contacts supplier for production or shipping plan. Moreover, delivery date reminder can be periodically set up by the buyer to ensure delay-free shipment.

✓ Step 6: Evaluation

After comparing the shipped PO's invoice with the shipment that is received at the buyer's premise, the buyer is going to pay the supplier within the agreed terms and conditions. Supplier evaluation should be made finally in this stage to decide whether that supplier should be chosen for the next PO or it should be replaced and reselected.

Procurement activity is the important role of any industry and almost of it should be controlled by the buyer company to ensure the competitiveness and the confidentiality in their own business. Logistics and shipping function could apparently be recognized in step 5 (Expediting) and this is where buyer company can seek outsourcing opportunity to render huge benefits.

Order management service provided by a LSP could be exactly what the buyer needs to not only organise the shipping but also proactive collaborate with vendors to update, keep track and ensure that the PO is shipped on time and in full. With this service, the buyer could be guaranteed by logistics experts that the PO has been confirmed on board in full and in good condition, then the payment can be made without confusion. Purchase order management service can help buyer company in supplier relationship management (SRM) and connect with origin vendors for fastest and trustworthy real-time update. In an attempt to gain the best advantages for the buyer who is OM's customer, OM team practices advanced status check with vendors

and moreover, proactively carries out cross-border shipping plan for vendor commitment beforehand. Those data, of course, confirm with buyer for their full visibility in supply chain and early disruption acknowledgement for proactive decision-making.

3.3 Electronic Data Interchange (EDI)

There are many channels for B2B data communication from company to company such as email, fax, postal mail, message, phone call and much more. The Electronic Data Interchange (EDI) is one modern option with its unique data standardization features which enhance the intercompany communication. This technology was considered useful for solution suggestion of this research. Therefore, it is a need of understanding of this communication solution.

As defined by the biggest computer company in the world IBM, EDI data transmission enables one-to-one communication in form of standardized electronic document exchange between trading partners. EDI is currently the most common data-sharing solution among global freight forwarder and at Expeditors as well to ensure efficient operation with its network of offices with shipping partners and customers.

It is worth mentioning how document flow is with faxes and mails before listing out the benefits of EDI over traditional practices. The example is the process of submitting shipping instruction (SI) via emails or faxes.

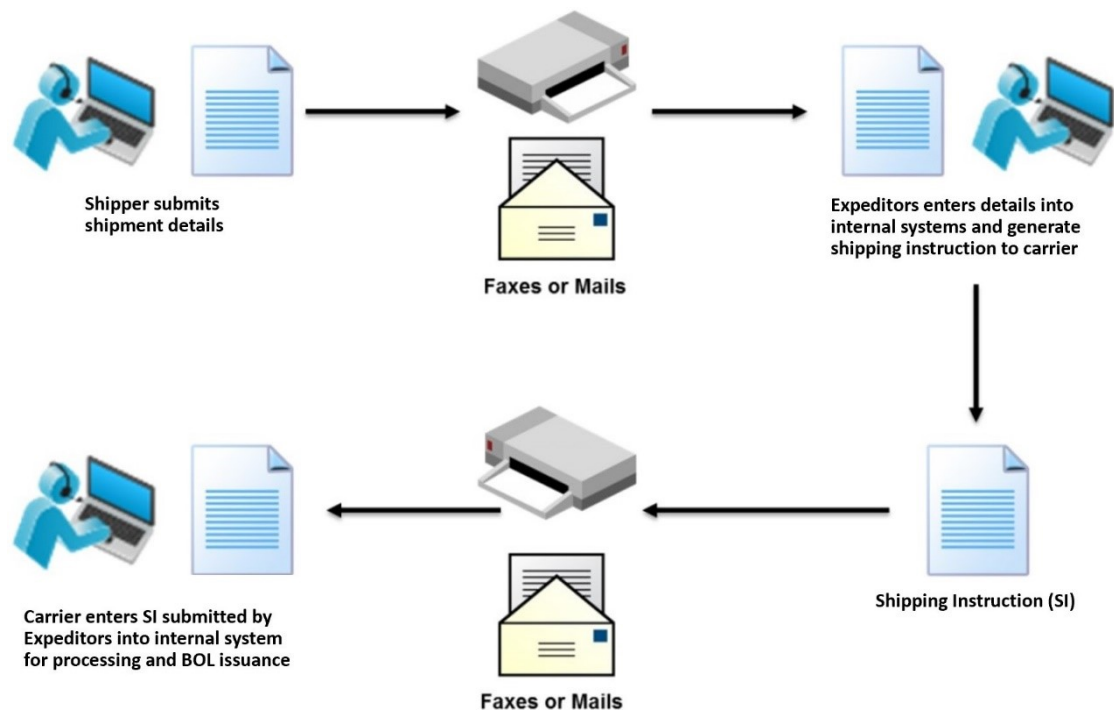


Figure 7. Document flow example without EDI

Without EDI, a simple process turns into a lengthy and time-consuming one with double input problem, allowed human's tapping error and resource consumption. Despite of its inefficiencies, it is still a very common practice in the industry nowadays for a group of transactions since EDI adoption is not achieved by all. Fortunately, almost shipping carriers has EDI system in place which facilitate the process with outside parties.

EDI system is a business-to-business (B2B) data communication solution which renders various benefits over traditional practices of postal mail, fax and email:

- Cost reduction
- Elimination of delays in paper-based exchange
- High processing speed
- Error avoidance
- Double input eradication
- Lower human involvement
- Minimal paper usage

Documents exchanged via EDI are processed by computer instead of people, the electronic documents must be standardized and agreed by both partners. ANSI, EDIFACT,

ebXML, X12 etc. are EDI standards available currently (Mani, 2019). Information extracted from Enterprise Resource Planning (ERP) or internal information system of a company must be available in a specific standard format which is agreed between a company with its partner. EDI documents sent by sender are processed through appropriate applications on receiver's system to generate a result as set up. For example, Expeditors' computer can understand data sent by shipper, input information into internal system and moreover, enable document-processing. It is surprisingly no human-involved in reading, understanding and entering data into company's internal system. Indeed, people are only responsible for executing the action.

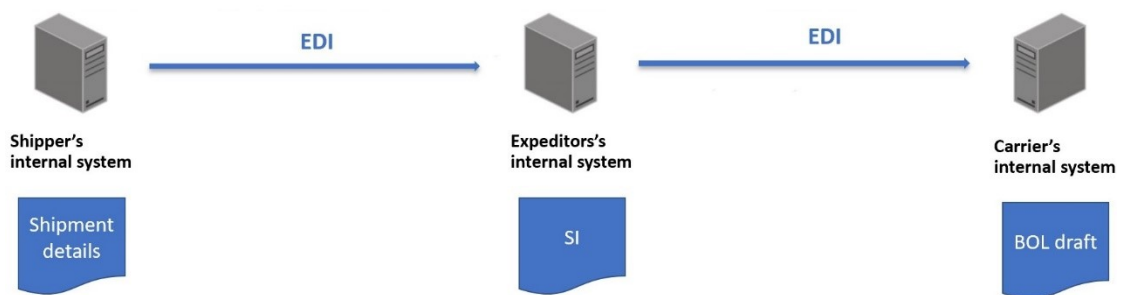


Figure 8. Document flow example with EDI

EDI is built in computer-to-computer architecture so that one document or data event is transmitted or triggered from one sender's computer to one receiver's computer. The data communication is similar as email in which it is based on point-to-point transfer. In the other words, the data can reach one receiver with one transaction and ten receivers may require as much as ten transactions.

3.4 Blockchain Technology

Blockchain technology goes viral suddenly after numerous headlines on the first use case in cryptocurrency named "Bitcoin". Blockchain technology has been universally acknowledged as the revolution in systems of information record. The potential use of this technology in development of modern world is far beyond just cryptocurrency area. Since 2018, numerous of applications has been researched and tested in diverse industries. The contribution of this distributed ledger technology (DLT) to supply chain management and logistics industry is expected to be huge. Various projects and

blockchain platforms have been studied and tested. The famous project “TradeLens”, a trade platform for tracking and tracing international shipment created by the collaboration of IBM and Maersk, can be taken as an interesting and promising example for blockchain’s potentials. At the same time, a plethora of projects has been carried out by network of banks such as “Marco Polo”, “eTrade Connect” in researching smart solution for trade finance in the Blockchain-powered digital era (Ganne & Patel 2019, 40). Moreover, projects on digitizing commercial documents (such as electronic bill of lading) from companies Bolero, essDOCS or Wave has been successful in an attempt to support blockchain-powered platform for international trade. Those projects are the most reliable evidence for the rise and influence of blockchain in logistics industry, especially for shipping activities in upcoming year. Blockchain is considered as the optimal answer for the complicated and lengthy process of shipping and forwarding in international trade. In this study, blockchain technology application has been researched based on the background of order management operation.

This section aims to indicate the need of blockchain in modern world, technical insight of blockchain technology and its operation principle.

3.4.1 Centralized Vs. Decentralized ledger

Getting to know the conventional database platform and having a comparison between it and the modern one can provide better insight in the need of blockchain development and implementation in nowadays digital economy. Both centralized database and blockchain technology operate on an end-to-end communication platform where the data can be shared to a network of participating members with one transaction. Despite of its similar data-sharing feature, the architectures of the two technologies are different from each other and thereby, existing their pros and cons.

Traditionally, database has been maintained on a centralized ledger controlled by single central authority. Data accessibility has been relied on the manager of the ledger. It is undeniable that the centralized database is a great data recording model which acts as a middleman trusted by all parties (Boucher, Nascimento & Kritikos 2017, 5).

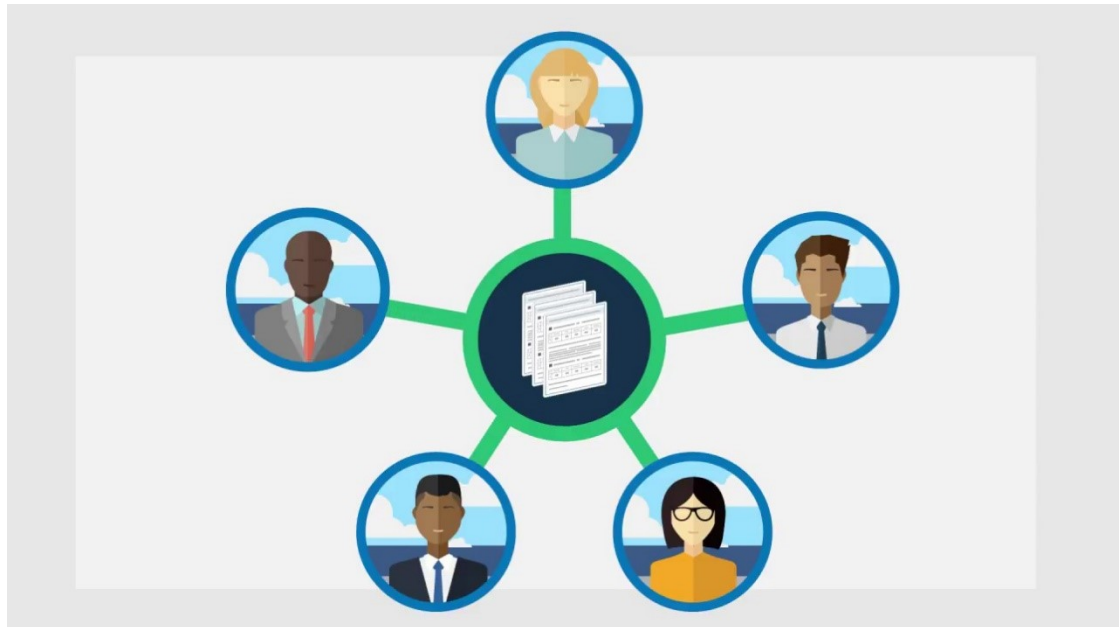


Figure 9. Centralized ledger

However, shown clearly in the above figure, the biggest drawbacks of this model are putting a lot of power on the hosting service provider who owns the ledger. It may arouse controversy about the data security and ownership. Additionally, only user with permission from the host can view a limited amount of data. Centralized web provides low degree of data visibility and transparency. By that, the original owner no longer owns the data. Additionally, normally only the newest version of data is stored in a centralized database. This method is only highly preferred in the internal data systems of business companies or by streaming service provider such as Facebook, Netflix or Amazon. It is not recommended for external data communication solution due to its architecture and drawbacks. In recent years, the potential use of blockchain technology has been recognized. Numerous researches have proved blockchain as a game changer in the revolution of information record systems and its ability in dealing with what centralized ledger cannot solve.

Blockchain represents for a distributed ledger technology (DLT) that designed for tracking and recording information or transactions which can be financial transaction, documents, ownership, and so much more. In contrary to traditional model, blockchain supports peer-to-peer network which is decentralized in its architecture as shown in the below figure.

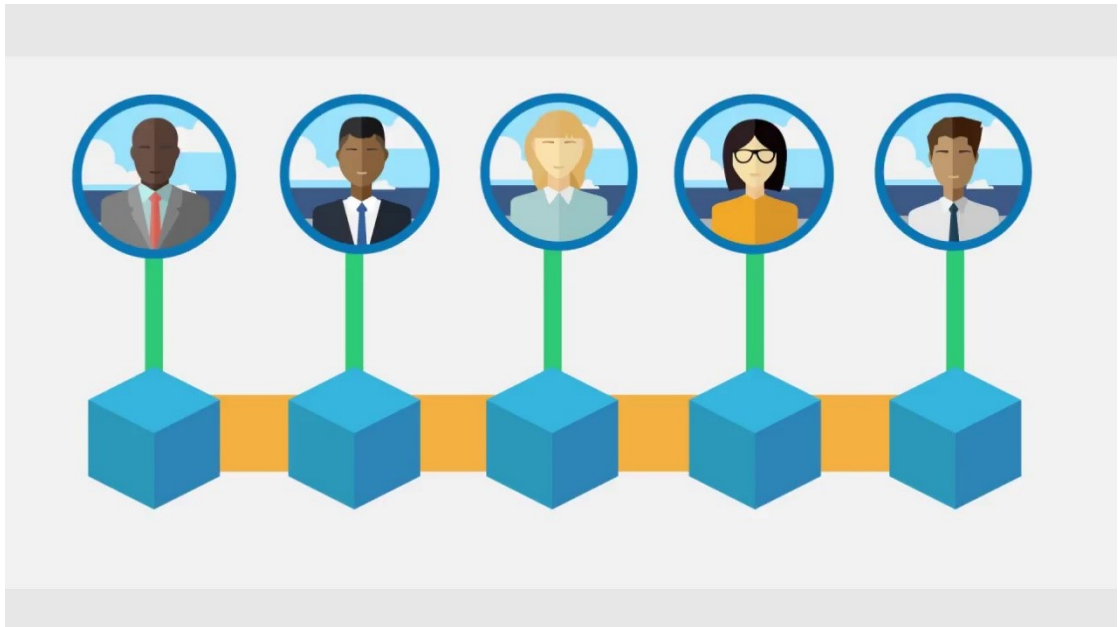





Figure 10. Decentralized ledger

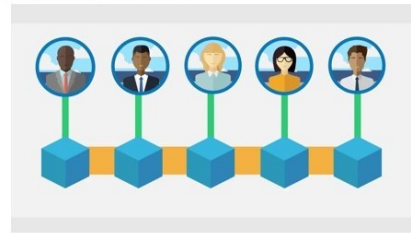
Data is authorized, verified by and accessible for all users within the network, not by any single entity. Technically, every user holds a copy version of the transaction which could be information, document or confirmation. Additionally, blockchain-powered system allows accessibility to the entire history of data changes while only the most recent up-to-date information can be stored in centralized database.

End-to-end data-sharing solutions



Centralized database

-  Too much power on single central authority
-  Data security & ownership
-  Only the newest information stored



Decentralized ledger – Blockchain Technology

-  No single entity
-  Each party holds a copy of the truth
-  Data validation process and tamper-proof feature
-  Entire data history tracking

Figure 11. The comparison between centralized database and blockchain architecture

Given is the summary of the comparison of centralized database and decentralized ledger. It is no exaggeration to state that blockchain with its decentralized architecture is fully capable of so much more than just the world of cryptocurrency and definitely able to solve mentioned problems of centralized web.

3.4.2 Blockchain's operating principle

Blockchain system is designed to be decentralized and distributed across a large network of computers instead of a central database. Some questions concerning blockchain and how it actually works are answered and well-explained in this section to support the study.

Who can view the data in blockchain? Blockchains can be classified as “permissionless” which is public for everyone to join in the network such as bitcoin trading platform or “permissioned” whose network is restricted to specific a group of actors only such as a consortium of companies or personnel within one company. Practically, blockchains of a wide range of applications in logistics are categorized as “permissioned” (Ganne 2018, viii). Those actors included in a particular blockchain have power to view, check and add transactions or new block into the system. Basically, everyone on the chain holds a copy of the shared transaction. Additionally, there are also hybrid models in which some users have the authority to view and execute all the data in the blockchain ledger, but some other user can only view a part of data named “public data”. One example for the hybrid version is a business blockchain of consortium companies in which authorized employees of those companies have full rights to access the data in the blockchain-powered system but customers of the companies can only view the process, key mile stones and current stage of their concerned issue. It is not true that all types of blockchains can ensure fully decentralization in its architecture. According Ganne (2018) reported in WTO's research, the permissioned blockchains such as private and consortium blockchains works on partially decentralized platform.

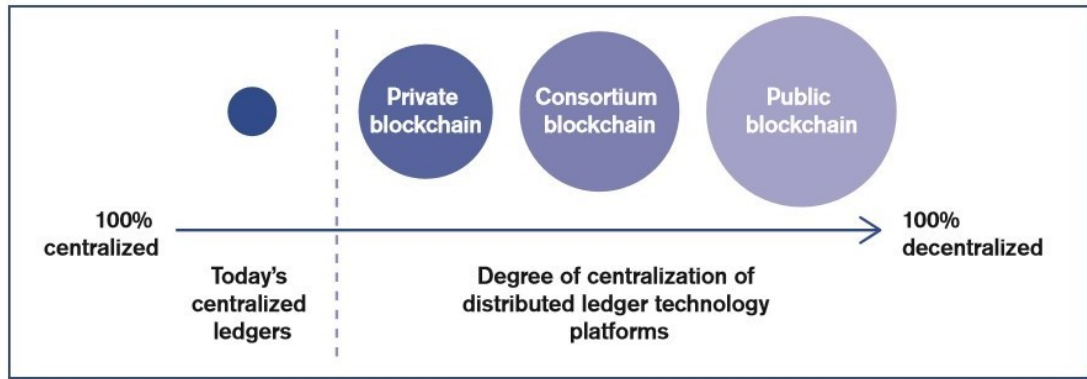


Figure 12. Decentralization degree in types of blockchain (WTO, Ganne 2018)

In permissioned blockchains, only a few predetermined users or nodes participate in data verification process and decide who is involved in the ledger. There are also some limitations inside the blockchain itself that the “lead” nodes are able to set up rights and level of accessibility to participants. For instance, if a consortium blockchain consists of 20 companies and there is a company 2 who works with companies 6, 7, 8 only, then company 2 is decided to only view shared data from the three companies where it is involved. By this, a blockchain is flexible and customized according to the need of each participating party.

As said by Centre for International Governance Innovation (CIGI), “Blockchain technology stands to revolutionize the way we interact with each other”, but what makes blockchain unique and how it works is much more interesting.

How data is trusted and added in blockchain? Since blockchain works with decentralized architecture which does not belongs to any central authority, the data must be authorized and validated for its legitimacy by most of or all the users or the lead nodes in the network before block creation. The below figure suggests how the verification process must be done before a new block is added into the blockchain.

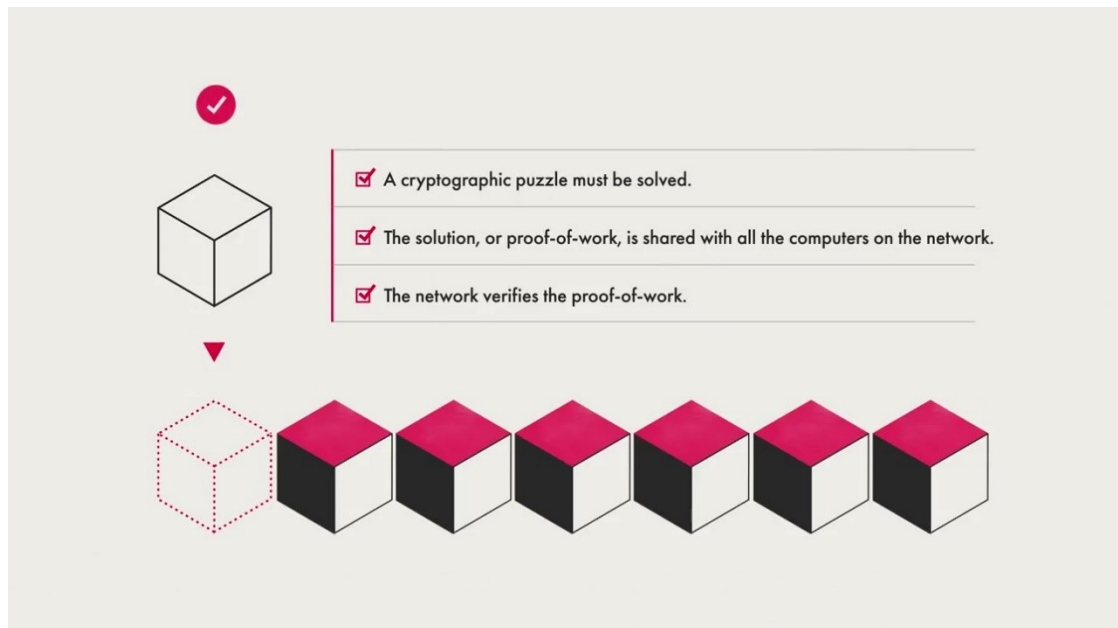


Figure 13. 3 steps for adding a new block into blockchain [CIGI]

The new block might get rejected if any discrepancies found. “Proof-of-work” mechanism for data validation is mostly used in public blockchains while “selective endorsement” is more preferred in permissioned blockchains because of its quick processing performance and less computational power required. As discussed in the blockchain in-depth analysis by European Parliamentary Research Service (2017), the checking process is automatically done in a reliable fashion on behalf of each blockchain user ensuring fast, secure and tamper-proof information system (Boucher, Nascimento & Kritikos 2017, 5). The complexity of verification data added into block reduces risk of tampering and simultaneously creates trust throughout the network.

How data is stored, updated and tracked in blockchain? Data or transactions are stored in separate blocks which is linked continuously to each other forming a chain of blocks using cryptography in a chronological order. Once the data has been recorded into the block, it is time-stamped and impossible to be rewritten. No data in an added block can be modified. Instead of that, the false or old information can be updated by adding a new block into the chain. The details of which information has been changed to which information, at what time on which day, by whom will be fully recorded in the new block. That is how the data can be changed within the chain of blocks. The entire historic versions of data can easily be tracked over time including attempted

changes made to the data. This feature is undoubtedly important in the digital world where every transaction and documents are transmitted online and easily to be copied and pasted or modified without authentication. Therefore, blockchain technology helps in enhancing data security, ensuring tamper-proof data and traceability.

3.4.3 Benefits of blockchain technology in foreign trade

There are numerous potentials of blockchain which may transform the way people doing business with each other in a near future or even now. As mentioned in the research of World Trade Organization published in 2018 written by Ganne, benefits of blockchain in foreign trade is as but not limited to:

- Enhancing efficiency in trading processes
- Increasing transparency throughout the chain
- Creating trust with tamper-proof feature
- Digitalizing documentation process
- Being programmed based on the needs and purposes
- Opening new business opportunities and services

These benefits are the best reasons for any organization to take the next step in researching for applications supporting their own business and the market.

4 Research results

Simultaneously with implementing the theoretical framework, necessary data was collected to support the research results and achieve the intended outcomes. Throughout this chapter, practical data collection and processes to present the answer to the research questions are carried out.

4.1 Data collection

As mentioned in the methodology chapter, four data collection methods were applied in order to collect as much supporting information as possible for the research purpose

due to its complexity of operation information. Apart from the information collected by the author through working experience in the setting, data was also collected by means of face-to-face meetings during the summer 2019 internship and by means of many distance-interviews during spring and autumn of 2020.

4.1.1 Interviews

Since the study was limited to the order management service for the ocean modes of transport, the interviewees were chosen mainly from the teams of the order management department, ocean export department and managers at the corporate level. The chosen OM employees were those who had been working on the procedure on a daily basis, and therefore they were able to provide practical and detailed perspectives to the operation of the work. Moreover, a comprehensive perspective offered by the district manager helped understand the issue at the strategic level. In addition, he also commented on the degree of applicability of the suggested solutions to the current situation. The data was highly trustworthy for its practical purpose due to the role and working experience of the informants, so that there was no need of many answers to the same questions about the procedures. Therefore, there were differences in interview questions for each participant according to their role, function and the data collection purpose.

Totally ten interviews were conducted with six informants who were district manager, ocean manager, OM team leader, booking OM employee and three document OM employees as listed in the following table.

Table 1. List of informants

Title of the informants	Interview date	Interview form	Discussed topic
District Manager	27/06/2019	Face-to-face	Inefficiencies, IT system
	30/01/2020	LinkedIn messages, Email	Improvement strategies

OM Team Lead	06/03/2020	Email, Phone call	OM procedure, target market, competitors, EDI
Booking OM agent	20/06/2019	Face-to-face	Booking with carrier, vendor's booking, PO management
Document OM agent (1)	25/05/2019	Face-to-face	Documentation with carrier
	21/02/2020	Face-to-face	Inefficiencies
	10/03/2020	Messages	Shipping documents
Document OM agent (2)	01/04/2019	Face-to-face	BOL generation, commercial docs collection, OM procedure
Document OM agent (3)	13/02/2020	Face-to-face	Inefficiencies
	26/03/2020	Messages	EDI

It should be noted that discussion via work email was not highly recommended in this case because it often caused delays in response. Instead, the informants involved in distance-contacting preferred messages and phone calls as a form of their interviews. There were three forms of interview which were chosen and arranged per informant's schedule to make the discussion as comfortable and suitable as possible for them.

4.1.2 Data summary

This qualitative study aimed at acquiring deep understanding of the research phenomenon in order to suggest a solution for identified problems. Therefore, the collected data was mainly responsible for supporting the author's study of the service, benchmarking with the current competitors as well as identifying the current problems and proposing a solution. Hence, there was no need for studying many cases, as it was possible to focus deeply on the topic with the participants in charge.

There were four research questions as objectives of this research, and the data collected in this phase provided practical and insightful information answering those questions. The host company assigned one mentor for supporting this research in order to ensure understanding of the service and its procedure. The mentor was included in the interview list. The first two research questions were addressed on a one-on-one

basis to the mentor, and they provided materials which are too confidential to be disclosed in this research. All information was reorganized and further studied in order to facilitate the presentation of the answers in the following sections 4.2 and 4.3. To address the third question about the inefficiencies and their causes in the current operating procedure, data was collected from the interviewees and summarized into the table 3 in section 4.4. Those inefficiencies are presented and explained in section 4.4 in detail to answer the third research question. Understanding of the operating procedure in section 4.3 assists in explaining of the identified inefficiencies. Based on those answers and the company's development strategies, the idea of embracing blockchain technology is suggested in section 4.5 by the author in an attempt to drive the company system closer to the digitalized world, and thereby solving inefficiencies and gaining strength over its biggest competitors. The data for the last question was mainly collected from theories mentioned in the literature review, studies and applications from big companies. Therefore, the solution is mostly theoretical because the new technology is still in its infancy.

4.2 Market Research

This section aims at revealing description of order management service and its market, and eventually points out the key development area for the solution. The implementation process was as follows:

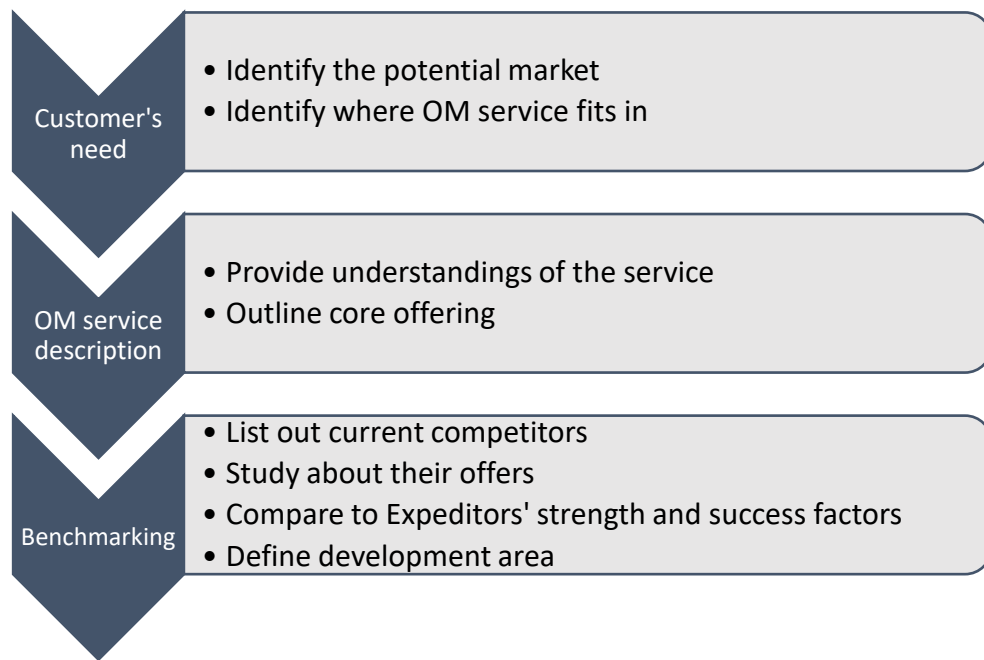


Figure 14. Market research process

4.2.1 Customer's needs

It is worth discussing about the reasons why OM service is needed by purchasing companies and problems which are tackled by OM service. Given is the figure concerning the most frequently reported problems leading to failure in purchase order management.

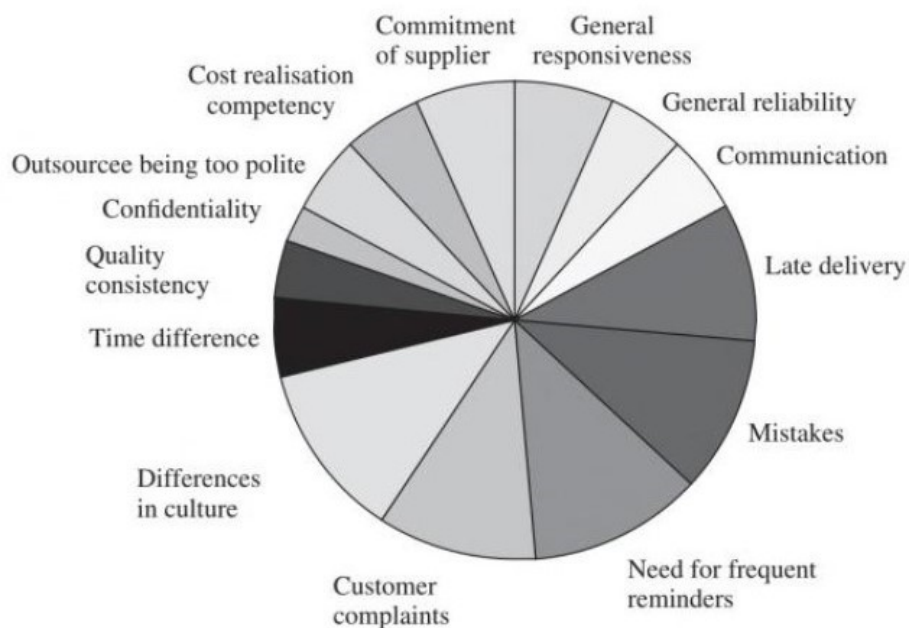


Figure 15. Common problems in international procurement (Mangan, Lalwani & Butcher 2008, 81)

It is apparent from the supplied pie chart that the four most common purchase order management failure are mentioned as frequent reminders need, late delivery, mistakes in shipment and culture differences. Speaking of frequent reminders, a buyer want to make sure that any mistakes are avoided and that they are always kept posted for any purchase order status. However, there may be delays in response due to the fact that information passing through departments takes time and this reminding task also requires much human resources from the buyer company. Besides, while ensuring the shipment compliance with agreed specifications in terms of quality, quantity, ready date, and shipped date is an important task in order ongoing monitoring, mistakes in shipment and late delivery are, however, often fail and acknowledged as very typical problems in internation trade due to a lack of management capability (Mangan, Lalwani & Butcher 2008, 77). As a buyer based in a destination thousands miles away, performing cargo management and having a check onto the freight before it is shipped are supposed to be impossible missions to procurement manager. There is a general consensus that discrepancies in cargo and shipment can be avoided by performing cargo check right in origin before it is stuffed in container for shipping and creating shipping plan ahead by origin logistics experts. Likewise, differences in culture can only be eliminated by partnership with local orgin logistics service provider. It is surprisingly if other problems shown in the figure were considered, almost of them can be overcome by buyer and origin freight forwarder partnership with a tailored solution. Some opponents of the view contend that supplier can book with a local freight forwarder who can help him plan the shipping as agreed with buyer. In spite of the fact that this is a common practice, this is not actually a solution for those problems mentioned above. What the buyer needs is a freight forwarder who can help them collaborate with the vendors in origin country and thus, manage purchase orders with vendors, contact vendors for merchandise delivery status, schedule the shipment as the buyer's requested, communicate any discrepancy with buyer and update shipping events.

Indeed, the vast majority of shipping issues can be attributable to ineffective vendor management rather than transportation. Due to long distance between the buyer and the vendor in cross-border trade, order management task encounters numerous difficulties. Consequently in an attempt to fix a problem, unless having full visibility far

enough upstream, what the buyer can do is react or reach a compromise. Without proper order management, an existed problem cannot be navigated until it has already happened.

Expeditors saw the need and thus, facilitate the creation of order management service to fulfill customer's wish. Although many other OM offerings tend to be fully software-driven solutions, Expeditors' OM solution additionally including people with real expertise and knowledge in the local context to anticipate and navigate issues in advance.

4.2.2 Order Management service description

The idea of order management service performed by a freight forwarder was born for assisting procurement professionals in managing and expediting their purchase orders at the sourcing locations in international trade.

Order management service is tailored to aim at long-term service agreement rather than for a single shipment or infrequent shipping practice. Our target market group is retail industry, including general merchandise, apparel & footwear, such as Walmart, The Home Depot, Columbia Sportswear, etc. The main operating routes is mainly but not limited to Asia – America, Asia – Europe to link especially manufacturing hubs in Asia-pacific with various destination markets.

OM service manages purchase order (PO) data in line item level and handles ocean freight export management in container level. With POs' details advised by the buyer, freight forwarder proactively collaborates with vendors in origin country to organize the shipment to destination in full compliance with export and import law and regulatory procedures. Customer is ensured with full visibility and control of the key milestones for order status update and shipping event. If there is any discrepancy between any PO's shipping booking by vendor with freight forwarder, freight forwarder then communicates with customer before confirming the booking and schedule the shipping. OM's core functions are customized to architect the best solution per customer's supply chain and value chain.

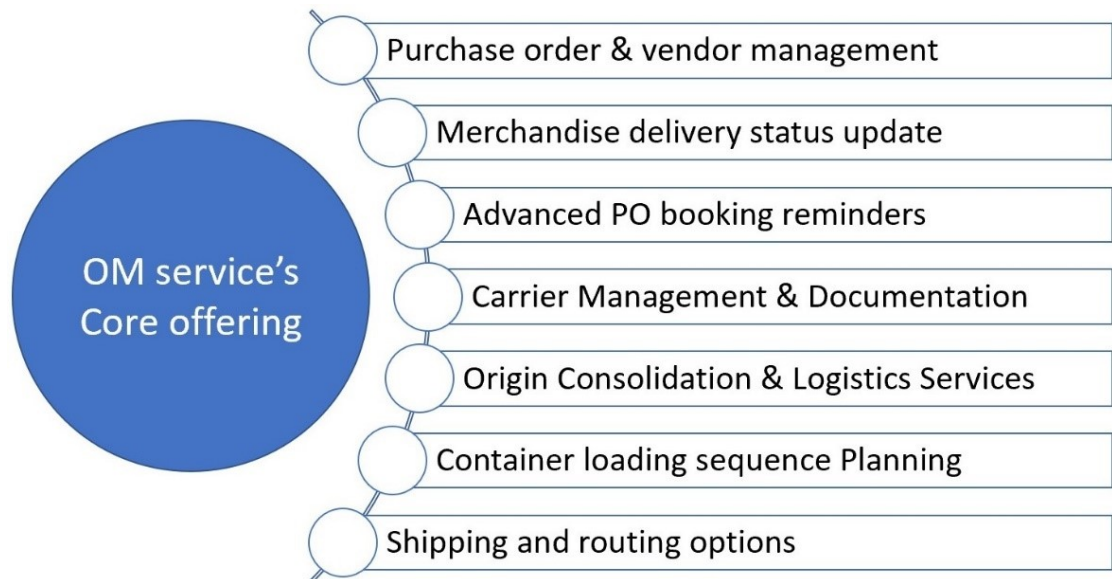


Figure 16. OM service's Core Offering

Purchase order management ensures that the PO is arranged shipped according to customer's preference down to line item level. Vendor's performance is monitored by local logistics experts in both collaboration and commitment aspects with vendor management functions. In pre-shipping stage, OM proactively requests vendor for merchandise delivery status update (early, on-time or late) in order to get insightful idea about the situation and adjust the plan immediately to avoid costly ad-hoc shipment. Moreover, advanced PO booking reminders are automatically sent to vendors mentioned in submitted PO, for instance, 21 days prior to PO open date. With full PO details, Expeditors shall proactively plan for the shipment in accordance with shipping requirements advised by customer. Since customer may have separate transport contract with preferred shipping lines for their own negotiated freight rate, customer shall advise Expeditors on carrier allocation in advance. Expeditors is responsible for handling the shipment with carrier and vendor. Additionally, each customer may have different practices in commercial transactions, transport or trade finance operation procedure so that document issuance is tailored per customer's needs to ensure their smooth operations. The combination of OM's proven standard operations and cutting-edge technology tools provides customer with end-to-end visibility throughout streamlined supply chain.

In the context of COVID-19 outbreak, many industries saw disruptions and delays throughout the supply chain due to production parts not arriving. This is a good example of how order management service benefits customer's supply chain for unexpected global trade disruption. With full visibility upstream supply chain, OM can help customer ease the possibly sudden disruption by early navigating any potential factory delays, vendor's status or plant shutdown based on local market updates. The customer can decide either to pull the order from production plants at high risk and relocate their source or adjust plans during the period of disruption (Weaver, 2020.) Upstream visibility is one of the main elements for driving resilient supply chain. OM's mission is to assist customer in managing the situation before it has even happened, not reacting.

With professional expertise in shipping industry, Expeditors is confident in understanding customer's needs and advising the best services to fulfill them. Expeditors acts as single point of contact of customer for managing all nominated vendors and purchase orders in one sourcing location. By keeping everything on the right track and well-scheduling all shipment in advance by dedicated account management team, each customer and vendor can optimize their freight movement, avoid unexpected ad-hoc shipments and improve supply chain decisions.

4.2.3 Benchmarking – Current competitors

Expeditors was 5th in top global freight forwarders rankings of Armstrong & Associates, Inc. in 2019 by gross revenue of 8,138 US\$ millions. The top two players in the list are DHL Supply Chain & Global Forwarding and Kuehne + Nagel (KN) with dominant amounts. Those two competitors have also similar service as order management, but with slight differences in operation, system and core offerings. The above ranking is only applied for overall business result but cannot tell their result in order management operations. Due to a lack of order management service information from all three forwarders, it is unable to rank which company for the best result in order management operations. This research concentrates on pointing out the difference in their businesses and simultaneously studying the key factors what make Expeditors stands out.

Table 2. Order Management benchmarking summary

Company	Headquarters	Types of organization	Service name	Main market	Industry sector	IT systems
Expeditors	United States (Founded in 1979)	Non-asset company	Order Management (OM)	Asia – US	Retail	1. EDI data transmission 2. Cloud-based IT systems 3. ***Investing heavily in IT system recent years
Kuehne + Nagel (KN)	Switzerland (Founded in Germany 1890)	Non-asset company	Order Management Solution (OMS)	Asia – Europe Asia – US	Retail	
DHL Supply Chain & Global Forwarding	Germany (Founded in 1815 as Danza then renamed)	Asset-based company	DHL International Supply Chain	Asia – Europe Asia – US	Retail	

Both originally European competitors are major players in Europe market with its high-density of offices, while Expeditors grabs the biggest share in US market. OM's source of income comes mainly from customers who are giant retailer originally from the US such as Walmart, The Home Depot, etc. They highly preferred choosing also Expeditors for their other locations, for instance, in Europe and Asia. The key sourcing origin of this type of services is nowhere else but Asia. Due to long history of establishing, the two giant freight forwarders own a dominant number of offices such as that Kuehne + Nagel (KN) has a network of some 1000 locations while Expeditors has 332 branches. Additionally, contrary to DHL who owns planes, trucks and many other assets to support its business, Expeditors and KN are non-asset companies. There are similarities in core functions of purchase order management service offered by all three companies with cloud database and EDI data transmission systems. It is hard to tell the differences in operations of them due to corporate data confidentiality. In terms of IT system, Kuehne + Nagel has its web-based system called "KN Login" which is introduced as comprehensive database stored documents and they enable accessibility to clients and authorized parties. DHL also has EDI connectivity into their cloud-based IT system to provide tracking and tracing functions. Expeditors' customer also has a powerful system "Exp.o Now" with similar features to ensure end-to-end visibility, helps save courier cost and speed up custom clearance. The embrace of new technology is widely believed as key factor to drive global freight forwarder ahead the pack. Therefore, all three forwarders strategically seek opportunities in digitalization and improvement in their current IT systems.

Doing benchmarking does not aim at imitating other mega freight forwarders but innovating. After gaining understandings of biggest competitors, it is time to point out what factors make Expeditors stand out from the others.

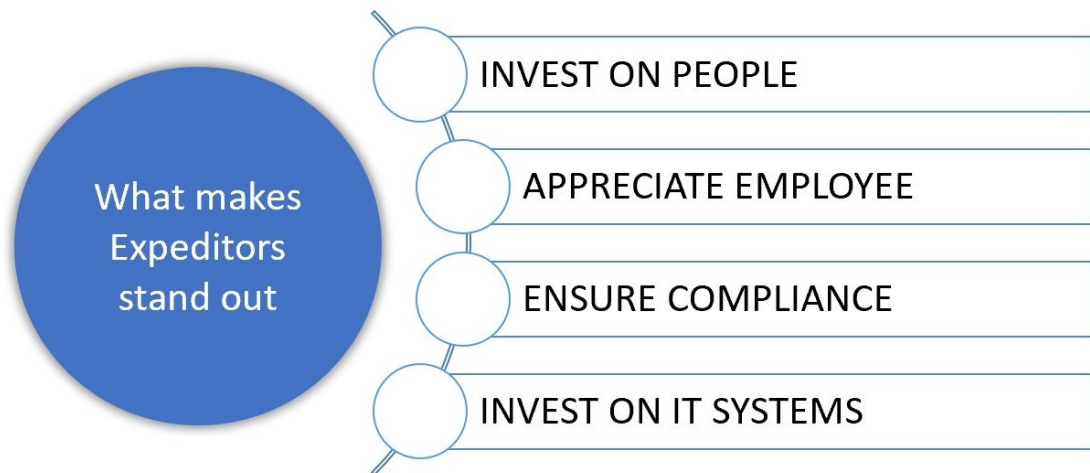


Figure 17. Key factors that make Expeditors stand out

Although Expeditors is a non-asset company who does not own any aircraft or vessel, their biggest assets are their people. No services including OM can be done without the participation of employees who mainly contribute to the success of the company. Therefore, Expeditors has been investing significant amount of time, money and effort in architecting the web-based training platform and development map per department for employees' continuous development in their career path. Any employee is required to complete relevant training courses listed in development map within job onboarding period simultaneously with on-the-job training. To boost motivation of every employees to continue learning, apart from that 52-hour worth training is required on-going career path yearly, employees are recommended to attend additional professional course about, for example, dangerous goods, compliance, law, etc., or complete certifications, or soft skill training courses such as presentation skill. That meaningful investment has gained strong return of one of the most professional, experienced and loyal workforces in the field.

Expeditors never forget to take opportunities to treasure their employees for their work and contributions. Expeditors celebrates employee appreciation day every year and they treasure it as their corporate culture. Employees are allowed to take off their

suits and put on casual clothes in that special day, then the employers serve them breakfast and lunch. After the eating round, the top manager will go to every corner in the office, talk to each employee and say thank you for their amazing work to the company. This is how the company show their employees that they are truly cared and appreciated. There is also other practice to celebrate employee work anniversary and say thank you for their dedication. At Expeditors, the president is the one who gives out the celebrating achievement package to his employees around the world with an appreciating letter and a service pin for their work anniversary.

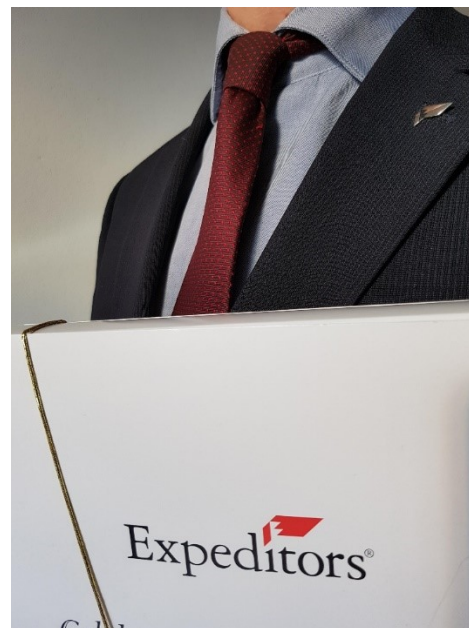


Figure 18. Celebrating achievement package and Service pin by Expeditors

The pin is a visual sign of recognition and they can take a pride in their everyday collaboration with the company. It also builds their loyalty forwards the company and improves the collaboration. Indeed, “It is no accident that employees feel so positively about their employers” (Ventrice 2009, xi).

The culture of the organization is shown clearly on how the company has been doing their business. Because Expeditors is an originally US company, they respect any compliance in their operations in order to allow no corruption or bad practice to drag them down off the competition. Expeditors treasures its culture of sustainable development rather than putting their operations at any risk. The hardest situation that the company might encounter in their expansion strategy and development worldwide is when

corruption is culturally accepted and desired in certain countries. Expeditors might face some difficulties in the first days of operating in new location, but their strong approaches against corruption-related practices turn into their strength lately. For example, in many developing countries, corruption in customs authority is widespread and they have been taken “speed money” to speed up the process. Expeditors, in respect of its business cultures, has been refusing to use “grease payments” in their practice. That sometimes put their operation staffs in a position to confront with the customs’ excuses for delayed processing. However, Expeditors has their anti-corruption actions to fight back such as ensuring their staffs well-trained for the process so that they can avoid unreasonable excuses. This is considered as a strength of Expeditors in partnering with their customer who also pursues sustainable supply chain management.

Besides dealing with external problems, the company should also concentrate on facilitating internal innovations. The information technology (IT) system is considered as the key driver of success in this industry. Expeditors has been investing heavily in its IT systems to improve data integration and visibility throughout the organization itself and customers’ supply chains as well. Expeditors was ranked first in data integration in 2016 independent industry survey. The internal information systems are connected and integrated with each other which provides convenience for agents to access and operate the procedure efficiently. By using various integration methods, Expeditors’ system enable flexibility in integrating with customer’s system and its approved parties’ systems involved in their supply chain. Data integration allows efficiencies in data sharing, eliminates double data input errors and speeds up processes. However, The other competitors have had also good and similar information systems to support their business. There is a need for an ambitious improvements to drive ahead the pack.

To sum up, the benchmarking outcomes showed that Expeditors with its valuable business culture has ensure its strengths in this competitive market. There is still plenty of scope for improvements in the information technology which has been gaining much attention and investments from many companies and especially from Expeditors itself. This point has suggested a promising development area which has been and would still be the trend in this industry.

4.2.4 Development area: Information Technology

As a famous statement made by Peter Rose, Expeditors Founder, that:

*“We’re not in the shipping business;
we’re in the information business”*

Indeed, Expeditors is a non-asset based corporation who books spaces from shipping carriers and resells it to customers with additional supporting services. The crucial part that Expeditors plays is managing data and information through the business chain. Furthermore, the data management is much more intensive with order management service where data is controlled from down to line item level up to container level. Therefore, information technology (IT) systems forms the backbone of the Expeditors’ business and this is the promising development area for continuous technological innovations.

It is apparent that the concentration on technology innovation has been prioritized by most of participants, especially the biggest competitors, in this fast-paced industry. Indeed, David Goldberg, CEO of DHL Supply chain & Global Forwarding, also affirmed that technology is the key driver in global forwarding industry. He also mentioned that digitalization, paperless operations and operational efficiencies are top elements in development trend of the industry (Burnson, 2018.) The top global freight forwarder Kuehne + Nagel (KN) has never stayed still as well. In January 15 2018, the Swiss-originated logistics group released the information of its joint venture with a Singapore investment firms Temasek Holdings. They jointly invested on early-stage logistics tech firms and the focus of area was mentioned as blockchain technology, big data, AI, automation and robotics (Leow, 2018.) Technology is the primary element and stays the top trendings in the fourth industrial revolution. It shall alter and affect many industries, and moreover, open new markets. (Schwab, 2016).

Expeditors has been developing a great business culture and defining its mission towards sustainability by investing in their people, retaining their core value in compliance and investing in its operating information system and much more. Those

are the key success factors that drive Expeditors in the top world rankings in the field. As Expeditors has been operating in one of most competitive environments with numerous well-known mega freight forwarder, Expeditors has never been allowed to rest, but keep innovating. Technology is the one of the most fast-paced area and it is believed as the key which could transform the logistics industry. There is always room for innovation in technology area. Since the information technology system is of utmost importance in Expeditors' business, continuous research and deployment of new technology should be given the top priority in corporate strategy list. This is considered as a prospective development area which may contribute hugely to the ambitious plan of driving Expeditors to become the market leader.

In fact, the information technology is a wide topic which consists of numerous areas such as internal data recording, data management, data analytics, External B2B or B2C data communication and much more. Therefore, the research needs a narrower focus point for innovation suggestion.

4.3 Order management's operating procedure

In this section, Order management service's operating procedure are provided and analyzed on 3 main parties' point of view which are customer view, vendor view and logistics service provider view (Expeditors' view) to provide the complete knowledge into its operations. By deeply studying OM operating procedure, it provides useful and comprehensive insights for reasoning current inefficiencies and seeking improvement solutions without causing new problems in the procedures. The information was collected by studying the provided materials about the operating procedure standards of the company. The materials were considered too confidential to be disclosed in this report. This section begins with the explanation of common shipping terms and documents which is mentioned in the procedure presentation.

4.3.1 Shipping terms and documents

There were many shipping terms and documents used throughout the operating procedure presentation and they were needed to be clarified beforehand to facilitate

understands of the process. This section can be considered as a dictionary for common terms used in the OM procedure.

1. Shipping Instruction (SI)

Shipping instruction is a form including shipment details about shipper, consignee information, notify party, container and seal number, and cargo details such as description of goods, number of cartons, weight and volume, etc. Shipping instruction is commonly advised by vendor to forwarder for them to arrange bill of lading instruction with carrier on behalf of vendor.

2. Bill of Lading (BOL)

Bill of Lading (BOL) is defined as a written statement that confirms the receipt of goods by shipping carrier in preferred condition and certain quantity. According to International Chamber of Commerce, bill of lading is the most important transport document playing its central role in export process of shipping and finance (Jimenez 2012, 192-193). This document is issued by the carrier company to the shipper or to the freight forwarder on behalf of shipper(s). BOL is a legal transport document and carriage contract between carrier and shipper which can control the freight release at destination (Raunek, 2019). BOL is issued at the time that the container(s) of goods is received by carrier. According to Hover (2019) on Expeditors' Horizon Blog, there are three main functions of Bill of Lading in shipping industry:

- Receipt of goods
- Contract of Carriage
- Document of Title to goods

Bill of Lading details the goods description in terms of weight, volume, number of cartons, etc. The carriage routing details are also indicated on the bill of lading as port of loading, port of discharge. The importance is that depending on the types of BOL, it could also act as document of title to the shipped goods so that whoever possess the Original BOL can control the release of goods at destination as long as the endorsement process is checked.

3. Container Load Plan (CLP)

Container load plan outlines a list of goods which should be loaded into a container in a planned sequence. The container load plan is mostly important in handling a full-loaded container consolidated from less-than-container (LCL) shipments. It can tell where a certain (LCL) shipment or a certain item is located in a container. CLP facilitates visibility inside of a certain container and speeds up unloading process.

4. Verified Gross Mass (VGM)

Verified Gross Mass is a document guaranteeing the total weight of loaded shipping container which is ready to be loaded on board the vessel. The new regulations adopted by IMO (International Maritime Organization) concerning the requirement of VGM in ocean transport came into force from 1 July 2016. Since then, shipper is obliged to submit VGM for every container to shipping line and/or terminal representatives. Otherwise, the container is not allowed to be loaded on board. There are two methods of weighing:

- Method 1: The full loaded and sealed container is weighted
- Method 2: The content cargo with all packages is weighted firstly and then, added up with the container tare weight shown on container's door to get the total weight.

It should be noted that shipper is fully responsible for the VGM and verifying the provided VGM is not carrier's or forwarder's responsibility. VGM can be considered as a commitment to safety (Maersk Line, 10.)

5. Letter of Credit (L/C)

Letter of Credit (L/C) is a service that buyer requests from their bank to make a credit guarantee to their foreign supplier in international trade. Therefore, the bank obtains full responsibility in issuing the L/C and sending the money once all the conditions met. The conditions stated on the L/C are tailored by the buyer to protect his rights in the business with the seller. Simultaneously, the L/C can provide confidence to the seller that they will get paid after commitment in the shipment as agreed with their foreign partner (Pritchard, 2019). The risk of non-payment in doing business with partner thousands of miles away can be avoided. Basic information on L/C is as:

- ✓ The amount of payment
- ✓ Name and address of the beneficiary
- ✓ The expected shipping date and how
- ✓ Shipment details
- ✓ Documents requirements (Commercials documents, Forwarder's Cargo Receipt (FCR), etc.)
- ✓ Additional conditions per customer requested

The seller can claim sale payment from the bank after a certain set of documents submitted to the bank to confirm the commitment on several conditions and shipping requirements. One of the most common document required and highly recommended for the L/C process is the forwarder's Cargo Receipt (FCR) which is well-explained in the next point. It should be noted that freight forwarder does not participate in the L/C process, a freight forwarder completes their job by issuing documents as customer required.

6. Forwarder's Certificate of Receipt (FCR)

According to FIATA, International Federation of Freight Forwarders Associations, Forwarder's Certificate of Receipt or Forwarder's Cargo Receipt (FCR) is defined as a document issued to shipper to confirm on the cargo and full set of commercial documents receipt. FCR is normally used to support the process of payment claim of shipper to the buyer under terms of letters of credit (Documents and Forms, FIATA, 7). FCR is not compulsory document for every shipment, it is additionally requested per customer according to their need.

The meaning and use of FCR might firstly create confusion with warehouse receipt or bill of lading. However, the biggest difference between FCR and Bill of lading belongs to the legal ability to control the freight release. While Bill of lading can control the release of freight, FCR act as an official document issued by freight forwarder to confirm on the good condition of goods received from the shipper which are ready for shipping to the buyer.

Forwarder's cargo receipt is, however, especially popular and highly recommended to customer of Order Management department. FCR's role perfectly fits into the need of OM activity speaking of vendor management and time reduction in passing bill of lading and other commercial documents through bank channel. The fact that paper-based bill of lading transferring may cause delay in import process. There have been situations that freight arrived at the port, but the consignee is unable to claim the freight because of bill of lading still in transit. To avoid that, rather than requiring bill of lading as negotiation document, FCR should take the role.

7. Cutoff time or closing time

The cut-off time or closing time is often used in logistics industry. The terms indicate the deadline or, in order words, the last possible date and time for a specific action to be completed.

8. CFS/CY, CY/CY, CFS shipment, CY shipment, CFS cut-off time, CY cut-off time

Firstly, it should be noted that CFS stands for Container Freight Station and CY stands for Container Yard.

CFS/CY stands for a shipment including a container in which several less-than-container-load (LCL) shipments are consolidated. It often happens with a shipment from many vendors shipped to the same one consignee. In normal practice, those LCL shipments are delivered to CFS warehouse of freight forwarder or carrier for being consolidated into a container. This is the origin of the term "CFS shipment" which stands for LCL shipment.

CY/CY stands for a full container load (FCL) shipment. The container is usually loaded by a shipper and shipped directly to the origin container yard of carrier's terminal. The container is transported to destination and unloaded off the vessel to container yard at destination for consignee to pick up. Therefore, CY shipment is considered as shipment with full loaded container(s).

CFS cut-off time is the deadline for vendor to deliver cargo CFS warehouse for consolidation into container. CY cut-off time is the deadline for vendor to deliver full loaded container to container yard of carrier’s terminal.

4.3.2 Customer’s point of view

As studied in the previous chapter, main customers of OM service are the buyers in international trade. As its mission, OM service is firstly created to help customer in finishing their procurement process and having the purchase order shipped to their premises on time and in full. Customer, therefore, no longer needs to invest effort and resources in the activities that is not their core competency. Purchase order management and expediting step are now outsourced and managed by logistics experts of OM department who plays the most central role of the whole process. Therefore, in customer’s point of view, the operation process is much simpler than that of other parties.

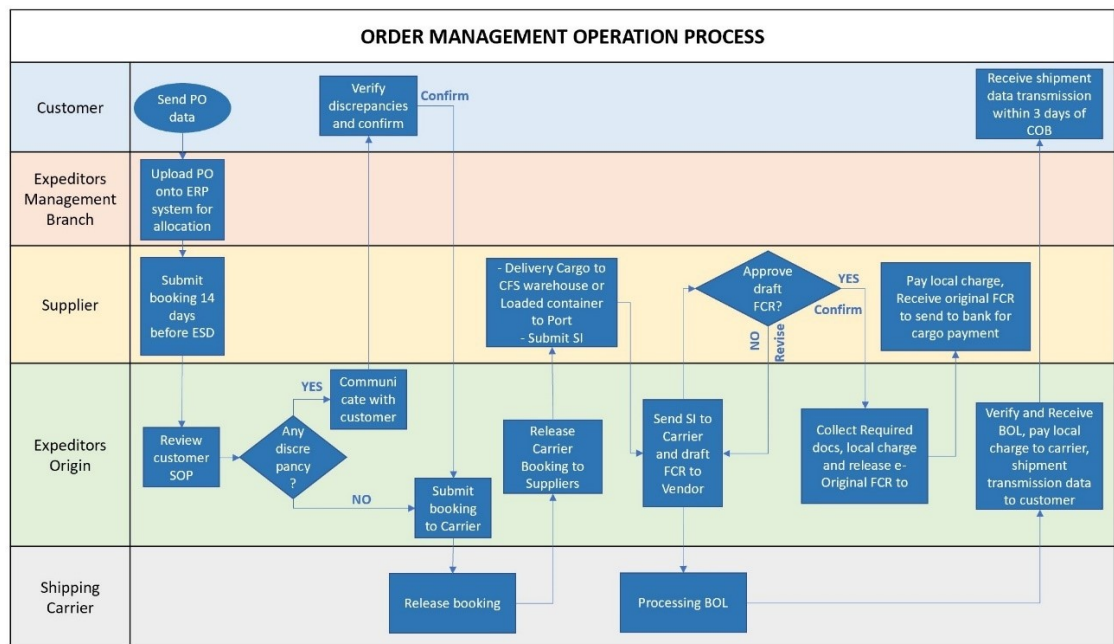


Figure 19. Order Management Operation Process on customer view

The process starts at customer’s role of submit PO data to Expeditors management branch. The data is then input onto Expeditors ERP system for assignment allocation. This stage decides which Expeditors branch(es) is responsible for which PO based on vendor’s geographical location, routing guide and/or customer’s SOP. The branch located in vendor’s country who handles exportation for the PO is called Expeditors

origin shown in the process. This branch plays vital and central role in collaboration with local vendors, carrier and other transportation service providers (if applicable) to generate a sound shipping plan for customer's interest. Every step should be complied to customer's SOP. Any exception in vendor's booking compared to PO data submitted on the system will be communicated with customer for approval. No booking confirmation is released until all exceptions are approved. Then, OM carries out its forwarding activities and keep monitor timely commitment of vendors according to the shipping plan. The details about timeline of each stage can be reached in section "Expeditors' point of view" in OM's standard operation procedure. The OM origin handles its job until cargo is confirmed on board, all required commercial documents and shipment data are transmitted to customer and/or Expeditors destination in timely manner. It should be noted that Import process is on destination side and can be handled by Expeditors destination or customer themselves whichever is preferred.

It is obvious that OM service can be customized per customer's needs and shipment country, the meeting between Expeditors and customer organization in management level must be organized in advanced to achieve service agreement and requirements towards long-term partnership. By this, Expeditors gets to the know the need of its customer and thereby, is able to provide the best support. Requirements concerning booking timeliness, types of transport documents, delivery details and elements shown on FCR, special added steps, etc. must be carefully discussed and clearly presented in customer's SOP for working reference. In order to outline a comprehensive set of requirements, especially about transport documents, Expeditors has to ensure customer's understandings of all types of shipping documents' roles and be able to give advices according to their needs and trade finance process. Those requirements are usually reviewed in yearly meetings or whenever changes are demanded.

4.3.3 Expeditors' point of view

As mentioned, Expeditors OM team is the main actor with central role in responsibility for purchase order management and shipping handling. The information system and B2B data communication solutions are acknowledged as one of the most important

success factors in Expeditors' business, especially in the data-intensive operating procedure of OM department.

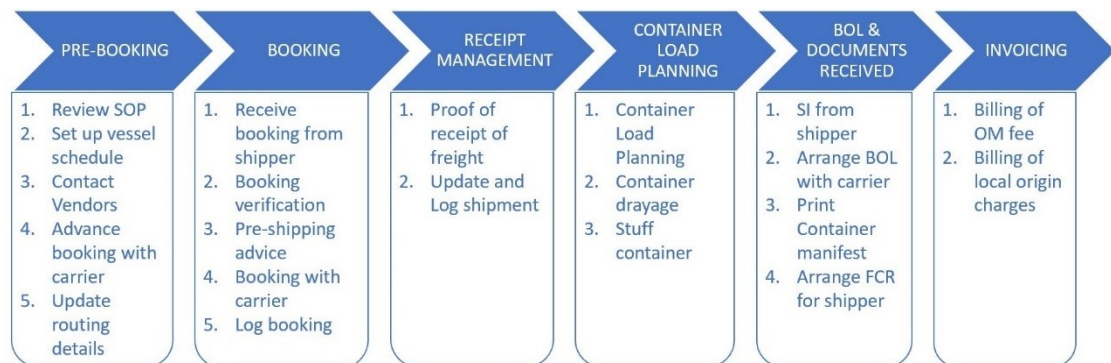


Figure 20. Order management - Origin process

1 Pre-booking

OM origin staff starts at pre-booking stage prior to receiving booking from vendor to define operating procedure in accordance with customer's requirements.

1.1 Review SOP

- Customer's SOP must be reviewed and well-understood to provide guidelines on how to operate the shipment of a specific customer by dedicated account management team.
- This step is mandatory for very first shipment of a new customer or for new agent who is assigned to perform for the first time in an attempt to avoid any unexpected mishandling against SOP and claim exposure from customer. Making sure that OM team fully understood all terms and requirements on the SOP is responsibility of OM team leader.
- This step might be skipped for agents who have had long-term practice and are familiar with the customer's SOP for similar shipment details. Any changes or new updates made to the SOP must be notified and reviewed.

1.2 Set Up Vessel Schedule

- OM origin shipping schedule are based on current carrier allocation by carrier(s) to be used and the vessel voyage(s) of each week.
- Set up the corresponding CFS and CY closing for each designated vessel/voyage. Shipping Instruction (SI) cutoff needs to be set up as well for shipment to, or in transit to, a US or Canadian Destination
- If, the OM origin cannot follow customer's advice to specific carrier allocation, an explanation notice must be sent to customer and to regional OM leader as soon as possible.

1.3 Contact Vendors

- Advance booking reminder is automatically sent to nominated vendor 21 days before PO Early shipping date (ESD)
- OM is required to contact vendor for merchandise delivery status for an upcoming planned shipped purchase order (PO) as specified in customer's SOP.
- Communicate information update from shipper to consignee

1.4 Advance booking with Carrier

- This step is needed during peak shipping season from May to October for high volume customers with their designated ocean carrier. By this, OM can reserve space from carrier in advance for OM use.
- The advance booking must be made preferably 1-2 weeks prior to actual sailing, depending on local carrier's requirement.
- OM shall inform carriers timely to adjust the space booked according to the actual booking received from vendors.

1.5 Update Routing details

- Routing details are required to be logged into the internal system
 - o Vessel name, voyage number, sailing date

- Port of loading, port of discharge, place of delivery
- Service contract number and carrier's SCAC code (the Standard Carrier Alpha Code)

2 Booking

This stage outlines essential steps to handle the shipment from receiving vendor's shipping booking to arranging the shipment and timeframe.

2.1 Receive booking from shipper

- Receiving booking from vendor is done via order management booking (OMB) system or in the form of written shipping order via fax or by email.
- Full details related to shipping and cargo are required.

2.2 Booking verification

- OM origin has to verify the information of the booking in accordance with customer's SOP
- The standard verifications are:
 - Vendor request FCR or BOL
 - Name of consignee
 - BOL destination
 - PO and item are valid – against PO details sent by account via EDI or hard copy
 - Others as per SOP
- OM origin is required to verify with vendor about any discrepancy to confirm the information of booking is correct. If confirmed, OM origin needs to communicate with account as specified in SOP for approval or instruction.

2.3 Pre-shipping advice

- Pre-shipping advice is a value-added service which, only specified in SOP, requires OM origin to inform to customer essential information of the upcoming shipment such as:
 - o Origin/Destination
 - o Vendor, PO, Cargo ready date
 - o Number of carton, volume, container size, CY/CY or CFS/CY
- For CFS/CY shipment, the pre-shipping advice must be sent on the CFS closing day.
- For CY/CY shipment, it must be sent within 1 business day after receiving the booking.

2.4 Booking with carrier

- OM is required to book and obtain the carrier's Shipping order of the approved vessel voyage
 - o For CY shipment, which is full container loaded by vendor, carrier's shipping order needs to be released to vendor after confirmed by carrier and 1 working day before empty container pick up allowed. This step facilitates vendor in arrangement of pick up of empty container from the designated location and timeline of operations.
 - o For CFS shipment, which is less than container load shipment that the shipper has to delivery cargo to Expeditors warehouse for consolidation, Shipping order number and CFS cutoff data and time must be informed to vendor.

2.5 Log booking

- Booking information must be timely input into internal information system as either specified in SOP or within 1 working day after shipping instruction cut-off.
- Logging PO with booking is required in item level for OM service.
- PO must be linked to the booking in PO level if item details has not yet available. PO item breakdown must be subsequently updated.
- Outgoing EDI transmission might be required by customer for update procedure details

3 Receipt Management

Freight receipt at Expeditors' CFS warehouse or at carrier's terminal data are timely logged into information system to provide visibility to customer.

3.1 Proof of receipt of freight

- For CFS, vendor has to arrange to deliver freight to Expeditors CFS warehouse prior to CFS cutoff.
- The checker shall count and record number of packages per each received PO/item and any exception or discrepancy (overage, shortage or damage (OSD)) must be noted in shipment file and notify OM with details.
- A warehouse receipt is released to trucker as the proof of receiving freight. Some origins demand shipper to return original warehouse receipt to OM to exchange for the original forwarder's cargo receipt.

3.2 Update and log shipment

- For CFS shipments, PO/item quantity and receiving date needs to be updated into the information system within 1 working day of freight delivery to provide PO breakdown data.

- For CY shipments which is also called factory load shipment, shipper is responsible for fully loading the container and deliver it to designated ocean carrier's CY port. Receiving information shall be input within 1 working day after shipper's written confirmation with fax copy of dock receipt issued by carrier or port sent to OM. Full detailed container load plan with essential information (PO, item, quantity, volume, etc.) by container must be provided also.

4 Container Load Planning

OM reserves the responsibility to control container load planning to ensure that CFS freight is consolidated properly and CY freight loading plan is advised to vendor prior to factory loading.

4.1 Container Load Planning

- Container load planning is always referred to customer's SOP for specific requirements.
- For CFS/CY shipment, OM consolidates CFS freight to build a FCL shipment
 - o The received CFS cargo is calculated to plan container
 - o When plan FCL, using the larger size containers whenever possible to maximize container utilization to minimize ocean freight cost to consignee.
 - o Special attention is needed to ensure that total cargo weight is not exceeding weight limitation of each type of container. The maximum weight is also restricted by the weight limits allowable by origin authority regulations, carrier, destination country whichever is lower.
 - o Load sequence is also determined but optional as specified by customer

- For CY/CY shipment where freight is loaded by vendor, OM can control the load plan if required by customer. Container load plan must be submitted by vendor to OM for approval prior to release empty container.

4.2 Container drayage

- Expeditors warehouse or OM arranges the empty container pick up and full container load return between the warehouse and container yard for OM consolidated loads (CFS/CY). In case that Expeditors warehouse is not located in the FOB (free on board) point/port and vendor are on FOB point/port sales term with customer, the drayage between Expeditors warehouse and FOB point/port is for vendor's account.
- Vendor is responsible for the pick up of empty container & seal, and return of full loaded container to the container yard for CY shipments

4.3 Stuff container

- For any CFS shipment, container load plans must be sent to Expeditors CFS warehouse in advance to arrange labor and container drayage for container stuffing.
- Proper material handling is required to secure the freight on place.
- Expeditors warehouse must record the loading date and time to make it available for OM team
- Container number and seal number have to be logged into the information system.

5 Bill of Lading (BOL) & Documents received

Documentation process has to be done timely and in full compliance with international trade regulations. This stage ensures that required document is issued as required by

the customer to vendor for trade finance or Letter of credit process and shipping information is transmitted according to customer's requirements.

5.1 SI from shipper

- Shipper is required to submit shipping instruction with container load plan to OM by SI cutoff set by OM by carrier's document cutoff.
- Shipping instruction from shipper enable OM to input cargo receiving information for consignee and arrange bill of lading instruction to ocean carrier on behalf of shipper.
- Other documents need to be submitted also such as commercial invoice (CI), packing list (PL), verified gross mass (VGM).

5.2 Arrange BOL with carrier

- The cargo and shipping information written on SI sent by shipper via email is then input into Expeditors information system with essential information shown on bill of lading in accordance with customer's SOP. Bill of lading instruction and VGM must be timely submitted to carrier by OM by carrier's document cutoff.
- Unless specific requirements, all bill of lading shall be issued to OM to directly forward to destination broker or consignee to avoid delay of paper-based document via bank channel.
- Only stipulating original OM Forwarder's cargo receipt (FCR) on letter of credit (L/C) as negotiation document for bank payment is highly recommended to customer. This approach can also avoid shipper bypass OM to ship cargo direct with ocean carrier.

5.3 Print container manifest

- Container manifest is a document showing the vessel/container/details along with PO/item's breakdowns, according to the loading sequence.
- This step of printing container manifest can simultaneously send the manifest to viewer via EDI. Some customer also requires outgoing EDI to trigger the message timely as specified time frame.
- If container manifest needs to be revised and re-sent, update the remark field to specify what have been changed from previous manifest and trigger. Print the final manifest again to send manifest to viewer.

5.4 Arrange FCR for shipper

- FCR data is linked with cargo data shown on the shipping instruction from shipper and prepared simultaneously with the arrangement of bill of lading with carrier in common practice.
- The FCR draft might be sent to vendor for verification.
- The original FCR is only released to vendor after:
 - o Commercial document submission by vendor (if required by customer)
 - o Freight receipt at Expeditors warehouse and at carrier's terminal
 - o Draft FCR verified by vendor and no need to revise
 - o Collection of the applicable origin charges as billed in invoice to vendor
 - o Shipment confirmed on board and vessel sailed (if required by customer or special requirement of some origins regulation)

6 Invoicing

6.1 Billing of OM fee

- Origin is required to manually input origin share of OM management fee and all out of pocket expenses manually prior to posting invoice to customer or accounts.

6.2 Billing of origin charges

- CFS charges, FCR fee and CY administration charge can be automatically computed while additional charges, if any, are needed to be manually input by OM origin to generate the invoice of local charge to vendor unless Ex Work (EXW) incoterm is used.
- Origin charges must be collected prior to the release of FCR to vendor.

In long-term practice, customer is expected only to submit all open PO data beforehand and advise carrier allocation, then let Expeditors do the rest to satisfy customer's needs. Full visibility of the workflow and events related to each PO shipment is ensured to customer. OM service is believed as the rising star in helping buyer in proactively managing shipment down to line item level, monitoring delivery performance of their partners and controlling the upstream supply chain for any unexpected disruption.

4.3.4 Vendor's point of view

Vendor is considered as one of the main actors in OM operation process. In order to reach the best results in collaboration with local vendors, the roles, rights and responsibilities of both each party must be carefully discussed and agreed beforehand in respect of customer's requirements. Additionally, offset rules are introduced to set KPIs for vendors and prevent delays which may end up as costly ad-hoc shipment.

In the early stage of collaboration, Expeditors OM team is responsible for introducing supplier shipping manual and providing full training program to vendors to ensure smooth workflow between two parties. OM team has its own system called Order Management Booking system (OMB) for receiving PO shipping booking from vendor.

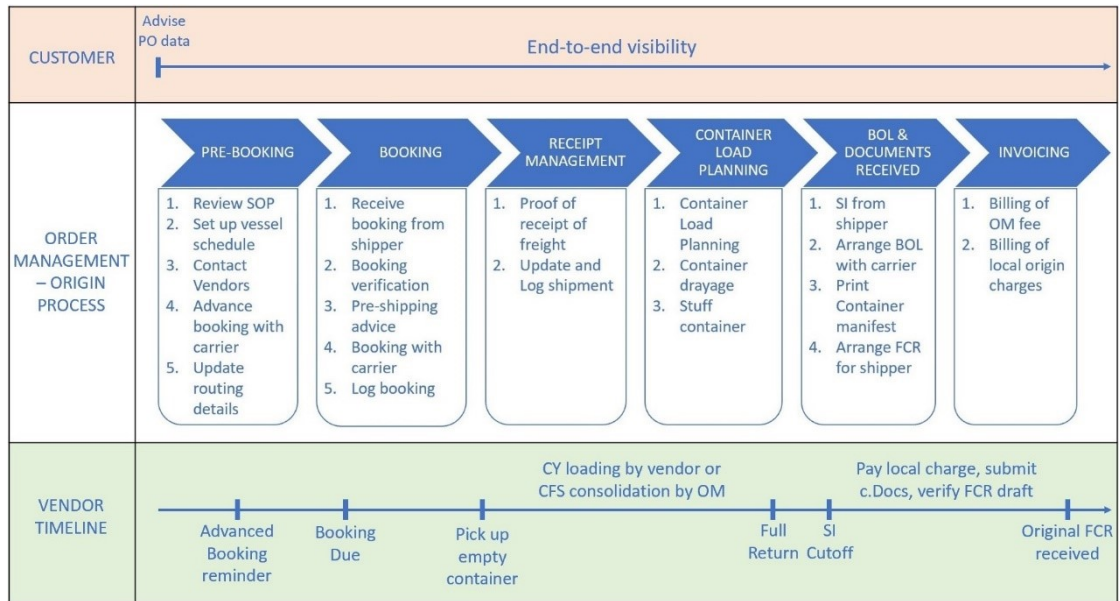


Figure 21. Timeline for vendor in collaboration with OM origin

As Expeditors has been updated with newly added POs from customer on weekly basis, all upcoming POs are stored in database for handling. Booking reminder for specific POs will be automatically sent to vendor via email 21 days before POs’ Earliest ship date (ESD) if no related booking received yet. Vendors are required to book with Expeditors minimum 14 days prior to ESD of any PO before its due date. Exceptions or discrepancies in vendor’s booking will be communicated with customer for approval before any booking confirmation release.

After receiving booking, Expeditors arranges booking with carrier and then, advise vendor according to carrier booking confirmation about shipping route, intended carrier, vessel/voyage and closing details. If it is FCL shipment, vendor should follow instruction in carrier booking confirmation for empty container and seal pick up, factory loading and return the full loaded container by CY closing day set by carrier. With LCL shipment, vendor is required to follow instruction from Expeditors to delivery cargo to Expeditors’ CFS warehouse prior to cutoff time for consolidation by OM. Container load planning is on OM’s control. Simultaneously, vendor is responsible for preparing shipping instruction and commercial documents to submit to OM by SI cutoff set by OM. OM reserves some time to arrange bill of lading with carrier and FCR for vendor on the submitted SI. Vendor needs to pay all local charges for OM origin, verify FCR draft and

submit all required commercial documents in order to get original FCR for bank payment.

4.4 Inefficiencies in operation process

Studying of the operating procedure of OM service provides an insightful perspective which helps analyze the causes and constraints of the inefficiencies in operation. In this section, the inefficiencies suggested by interviewees were reasoned and well-explained to seek rooms for improvement.

The inefficiencies were collected from in-depth interviews and analyzed in accordance with the operating procedure to explain for the effects. Most of them were related to the current external data communication methods. They were categorized into four main types and summarized into the table 3 below with its root causes and early suggestions outlined.

Table 3. Summary table of the inefficiencies in OM's operating procedure

No.	Inefficiency	Cause	Suggestion for improvements
1	Double data input	A Lack of data standardization and system integration, traditional communication approach (Email, fax...)	Electronic Data Interchange (EDI) data transmission
2	Manual document check	Too much manual data-processing and human involvement	
3	Overlapping document exchange	Current point-to-point communication solution	End-to-end data-sharing architecture
4	Paper consumption	Paper-based intensive procedure	Facilitation of electronic document issuance

4.4.1 Double data input and manual document check

Double data input and manual document check are identified in several stages of the operating procedure such as receiving booking from shipper, updating routing details into ERP system, updating shipping event, shipping document generation and issuance. Due to a lack of data standardization and traditional communication approach, the data is often exchanged in different forms and templates which likely results in time-consuming data re-entering and human-made errors. Because of the inextricable correlation, the two types are explained together in this section.

Documentation is one of the stages that requires heavy human involvement in data processing. Bill of lading (BOL) instruction process can be considered as an example for the two types of inefficiencies which are double data input and manual document verification. In this process, the freight forwarder is required to instruct carrier with details on bill of lading issuance prior to the document cut-off time. The process might sound simple at first, but in case of no discrepancy found, there are three times of double data input in all three parties' operations and at least one manual check in OM's operation. As observed during real experience working in OM origin team and understanding of the OM operating procedure, preparing for BOL issuance in practice is as follows:

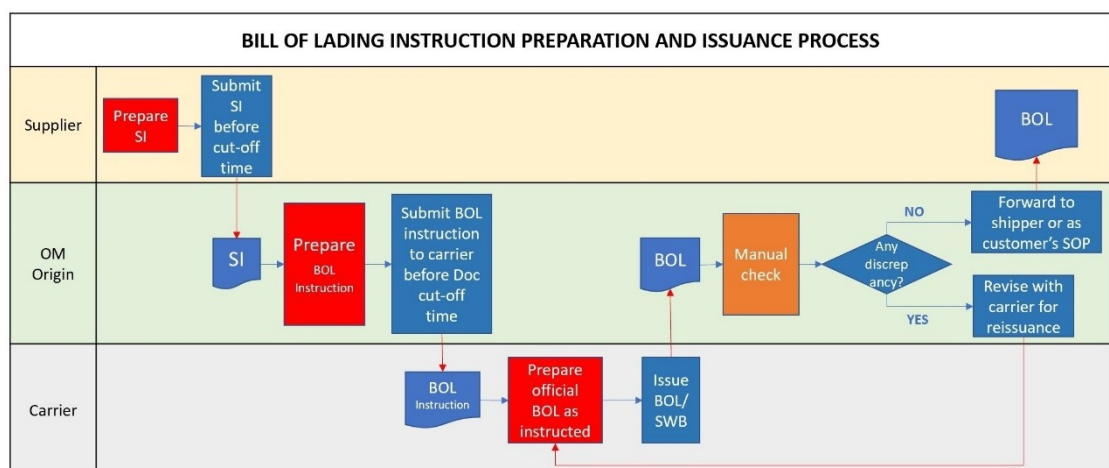


Figure 22. BOL preparation and issuance process

As demonstrated in the figure, there are several transactions among the involved parties which are highlighted in red arrows. The documents have been exchanging mostly by email or traditional channels such as fax or even paper-based documents in various forms and templates which allow barriers for data processing. Therefore, human involvement and the manual double data input are usually demanded. The steps where double data input happens are highlighted in red. As a result of manual data input, tapping or copy-paste errors are likely common mistakes which require time-consuming manual verification. The inefficiency is highlighted in orange. From technical point of view, the shipper is required to prepare and submit shipping instruction (SI) with full details about the cargo stuffed in container(s) to the origin OM department. The employee then re-enters those details into the company's internal system to generate bill of lading instruction to instruct carrier with BOL issuance. The carrier follows the instruction and prepare official BOL to the freight forwarder. When the document is issued to the freight forwarder, the document agent or assistant performs manual check on the issued bill to verify if there is any discrepancy. The discrepancy-free bill is then available for shipper pick-up or as instructed in customer's SOP. In case of any discrepancy found, it is revised to carrier for fixing and re-issuing. The bill goes through verification step all over until everything is as advised.

The process can also be much more complicated and time- and resource-consuming in case of large shipment and the exist of discrepancy. To support this point, there was one situation recorded from real working experience of a 26-container freight shipment which, because of discrepancies, went through manual check and was revised 4 times before being accepted. That bill included over 10 pages with a bunch of numbers and shipping information to be verified. It took approximately 15 minutes for each manual check and unknown reprocessing time. This can be one instance for the two inefficiencies which suggests a need of improvement.

The approach to data standardization and system integration is suggested by the OM team lead as possible solution for improvement and efficiency. Indeed, data standardization can facilitate machine-enabled processing in time- and resource-saving fashion, and thereby reducing the risk of human errors. As reviewed in the theoretical

framework, the EDI data transmission should be the optimal solution for these two types of inefficiencies.

4.4.2 Overlapping document exchange

At Expeditors and most of other organizations in the logistics industry, the most popular way to transfer data and documents is through emails, faxes, postal mails and limited application of EDI data transmission. That all of those approaches facilitate only point-to-point transactions is considered as the key reason for overlapping document exchange. An end-to-end communication solution should be applied to reduce the number of transactions and boost efficiency.

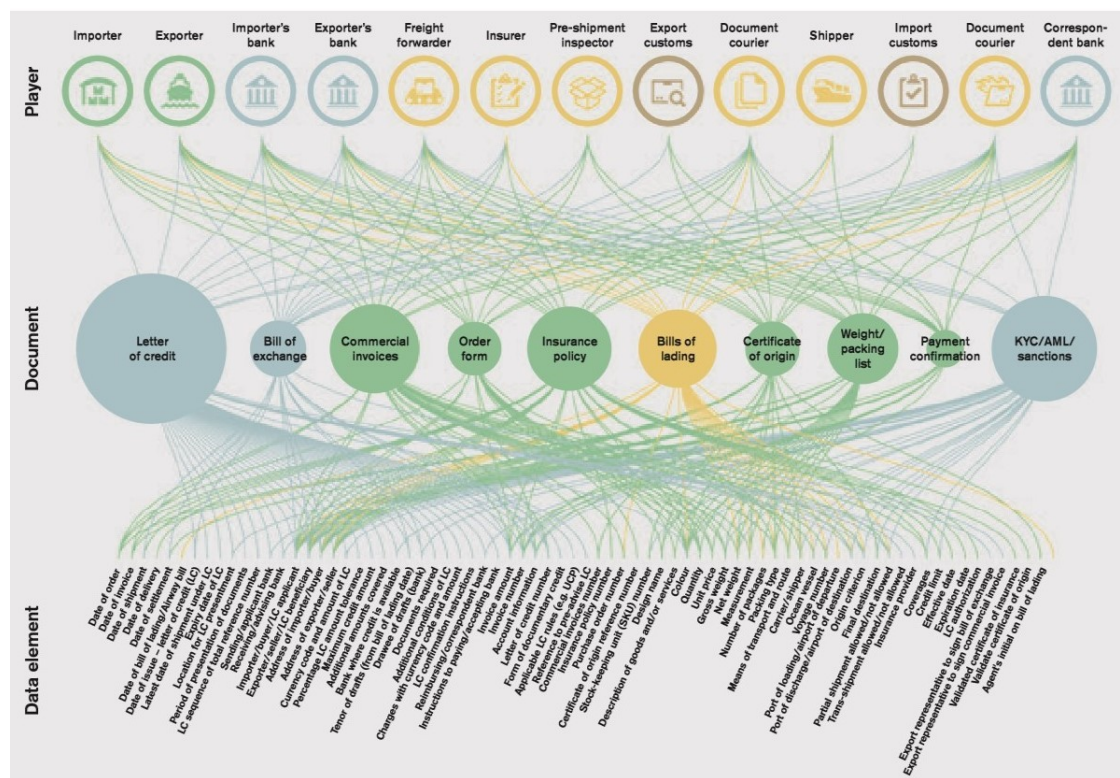


Figure 23. Typical data elements, documents and players involved in one cross-border shipment (Boston Consulting Group 2017)

Given is a figure indicating the complexity in data communication and huge number of document transactions involved in international trade. Therefore, the communication solution must be given one of the top priorities to optimize the process and save resources. In the process of freight forwarding, certain types of documents are issued by certain parties and the documents are required by many other parties throughout

the process. For instance, one Certificate of origin (CO) document can be required by the buyer, freight forwarder in origin and destination, export and import customs, shipping line and banks. In practice of OM operation, the shipper is responsible for obtaining the CO of the goods and then submitting it to the origin OM department. Origin OM employee has to ensure the document exchanged to the right parties for custom clearance, cargo verification and shipping confirmation. Therefore, there are several transactions which are necessarily made by the origin OM to forward the document to different parties.

This inefficiency can be overcome by enabling end-to-end communication solution with which the document can be available to all involved parties with only one transaction. There are two approaches which are centralized database and decentralized ledger. The solution is further discussed in the solution suggestion part.

4.4.3 Paper consumption

Many operations have been digitalized for a more sustainable world to reduce paper consumption such as available e-books for education, postal mails replaced by emails, commercial documents available in electronic forms, etc. However, paper still highly preferred in freight forwarding business in the current context which results in the inefficiency of paper consumption. This issue relates to the perception of electronic documents of parties in international trade. Therefore, there should be a solution which can facilitate the adoption of electronic documents.

The paper-based documents limit the flexibility of modification. Indeed, printed documents may be turned into waste for minor mistakes because of its important and formal roles in every trade process. For example, a printed FCR document is not acceptable even because of minor spilled ink mark done by the printer or a perfectly printed documents may be wasted also if there is a need of modification. Some customers or shippers require a set of one original FCR, three copied ones and attachments for each shipment. One set of FCR can include 10 pages easily and even more depending on how big the shipment is and how is required by buyer and vendors. Those pieces of paper are then picked up by vendors for claiming payment and else. Due to its

importance, if a minor mistake occurs, the whole set of documents cannot be used anymore. The given photo is very familiar to any OM employee that there are always piles of one-face printed paper available at their workstation. Those were used to print FCRs or any other important documents but with minor mistakes, they are all piled up for reusing. Although Expeditors has a good approach to reuse them as BOL/FCR receipt, that does not require much paper and then they still end up in the trash bin.

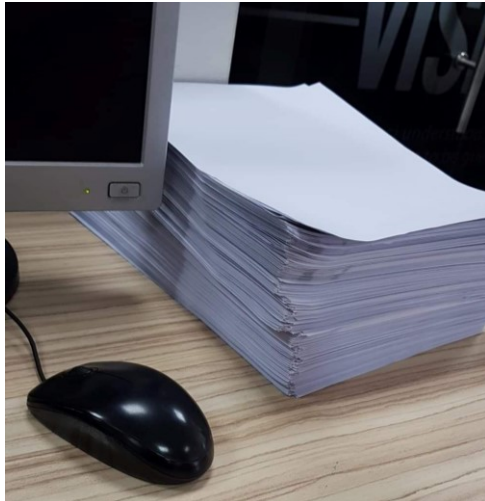


Figure 24. A pile of printed paper at one Expeditors' workstation

Despite of the fact that those printed documents are paid by the customer, still this practice is far against sustainable development strategy. The fact that there are actually a few customers who has been requiring FCR in electronic form rather than the paper-based one. This practice shows that the idea towards e-documents is applicable. It just depends on the perception of the involved parties.

In an attempt to reduce paper waste particularly in freight forwarding and shipping, an evolution of information system which can facilitate the use of electronic documents over the paper-based ones should be a promising solution. Only by this, will it be possible to gain traction and adoption from involved parties. Suggested solution for the inefficiencies is discussed in the next section.

4.5 Solution suggestion

By studying about the inefficiencies, the optimal solution should include the feature of data standardization on an end-to-end data sharing platform and it should be able to facilitate the use of electronic documents. In order to carefully consider for the solution suggestion, the current communication methods of Expeditors are analyzed and evaluated firstly to navigate the problem and discuss the options for the solution suggestion. Then, the solution is suggested and its improvements and challenges are also presented throughout this part. In this section, the blockchain-powered EDI communication solution is proposed for improvements in Expeditors' operations.

4.5.1 The current data communication solutions of Expeditors

Currently, the data communication between Expeditors and its external partners is carried out in many ways such as postal mails, faxes, electronic mails (emails), EDI data transmission and centralized cloud database. Amongst those, emails and EDI system are the most common approaches for data and document exchange while the cloud database is limited to the accessibility of Expeditors' clients only.

Electric mails seem the most familiar, convenient and flexible method which are compatible with almost of the existing computers without any extra technological investment required. Therefore, emails are apparently the main communication channels for external data and document exchange throughout the business chain in Expeditors' operations.

Besides, EDI data transmission is also available in Expeditors' information system. Although it has the feature of processing software-understandable structured information, in practice, the Expeditors' EDI system is carried out in narrower operation areas than emails. It has two main uses which are triggering shipping events internally within the network of the organization itself and updating the cloud database to ensure its customer's visibility. Apart from that, there are also some practices of data exchange between Expeditors and carriers via EDI system if

demanded by the partner. Therefore, the benefits of EDI data transmission have not been utilized to the max and thereby, the inefficiencies are allowed to occur.

Expeditors also operates a cloud database where all the shipping data and document are stored to provide end-to-end visibility. They can only be accessed with authorized account provided by Expeditors to its clients to see their shipping events. The reason for that could be that the cloud database is operating on a centralized architecture where there are certain drawbacks related to its single central authority, data security, ownership of data and data traceability as discussed in the literature review. Those cons prevent the system from being widely open for many external parties' accessibility.

In short, EDI data transmission should be encouraged and adopted widely to avoid the inefficiencies of double data input and manual document check for all involved parties. Additionally, due to its drawbacks, the end-to-end architecture of centralized database is not appropriate for the solution suggestion. In the other hand, the decentralized architecture of blockchain technology with its potentials is believed as the key driver to transform the data communication system with an end-to-end data-sharing platform and its feature in facilitating the use of electronic documents.

4.5.2 Solution: Blockchain-powered EDI communication solution

The features of EDI data transmission and blockchain technology shall not be able to bring the expected improvements if they work separately. After understanding the point and taking many considerations, B2B blockchain-powered EDI communication solution is suggested for the objective of this research. The innovation may hopefully bring a new generation of data recording to this industry.

In fact, the EDI system with its programmed standards can only act as a translator between data systems which helps in data processing to eliminate the inefficiencies in double data input and manual document check. Yet, there are two problems in data transfer that even EDI system cannot solve. One of them relates to the point-to-point operating principle of EDI which still allows the inefficiency in overlapping data and

document exchange. The other problem is that EDI has no feature to facilitate the widespread adoption of electronic documents in the industry. The two difficulties could be overcome with an end-to-end data-sharing architecture of blockchain technology. As researched by many experts and trustworthy sources such as WTO, FIATA, etc., blockchain technology is believed to deal with those two problems with its unique architecture. However, there is a widely held perception that no technology can completely imitate the complex functions of EDI in current procedures. Even intelligent technology such as blockchain is not expected to replace EDI in information system due to widespread adoption. Indeed, seeking opportunity to integrate blockchain into current EDI system should be taken into foremost consideration rather than taking the place of EDI.

The solution of B2B blockchain-powered EDI communication solution should be called the next generation of EDI data transmission with blockchain's architecture. With this solution, blockchain works as transmission medium of EDI system which no longer facilitate limited point-to-point data transfer but decentralized end-to-end data transmission. EDI data can be transmitted to a network of participating members included in the blockchain. IBM Food Trust was mentioned on Forbes article by Mani (2019) as an example of EDI transmission built on a blockchain platform and its purpose is to help Walmart in tracking and tracing its leafy green suppliers and shipments. This application shows the potentials of the combination of blockchain and EDI into information-sharing system. Rather than choosing from blockchain or EDI, Blockchain technology integration into EDI system contributes functionalities of both technologies to the current information system. Therefore, with little effort of transferring shipment's data to this blockchain-based EDI system, network members' computer can access the machine processable data they need for their process with only one transaction. This is how blockchain technology with its unique features helps eradicate unnecessary steps of the procedure and seeks improvements in current EDI system.

Technically, there are several aspects which must be carefully considered by logistics experts to give advises for programing the best fit-for-use solution for the organization and its procedure. Consortium permissioned type of blockchain is highly recommended in this case so that "B2B" keyword was added into the solution name. There

have been questions about energy consumption of blockchain platform and environmental concerns about its footprint. Unlike public blockchain, permissioned blockchain fortunately is energy-efficient because of lighter consensus mechanism (Ganne 2018, 92). The energy and computational power required for validating transactions or block are drastically lower than the consumption in public blockchain such as Bitcoin trading platform. Therefore, this solution is not against global sustainable development strategy. Blockchain implementation has been as a contribution to the achievement of the Sustainable Development Goals 2030 set by the United Nations (UN/CEFACT 2018, 4).

Besides, one of the major concerns is to decide which parties included in the chain and how to collaborate and control. The accessibility throughout the chain must be set up beforehand so that each member in the chain knows their role and liabilities, and at which stage they are involved in the procedure.

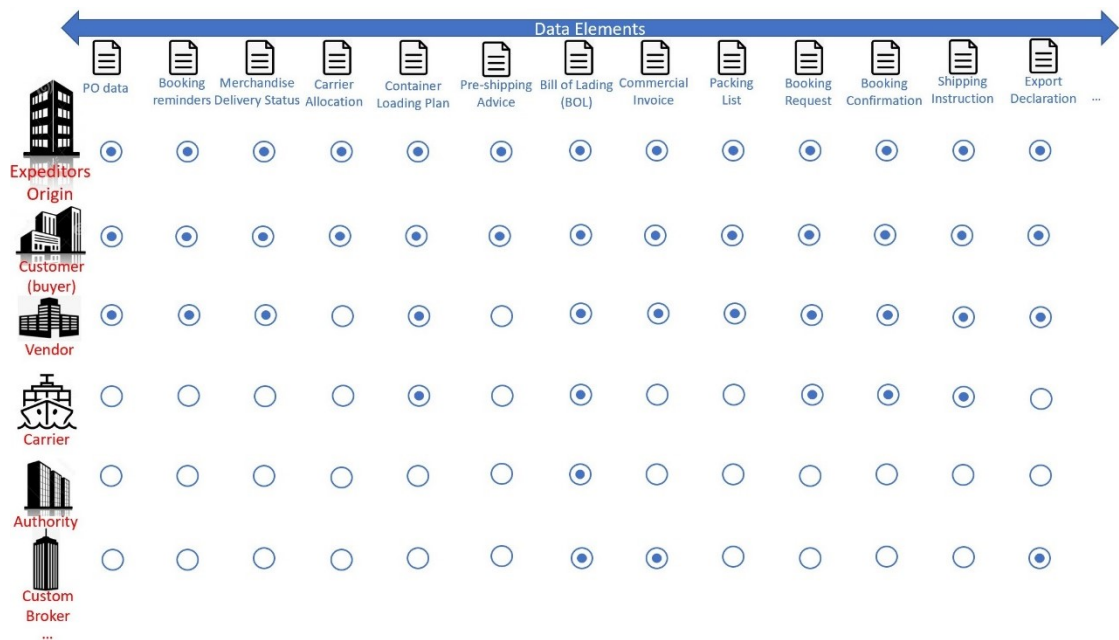


Figure 25. Example of permissioned model in blockchain-powered system

The above figure gives an example of permissioned model of shipping data and documents to the involved parties' accessibility. The model authorizes on which stakeholders can add or modify data, access which documents at each stage. As described in literature review, one party, who is responsible to process a certain document, send it

to the network of blockchain so that every permitted node can have a copy of the document. This is the core function of blockchain when it is applied into the EDI system. In fact, there are many more aspects which should be considered while designing the system. Therefore, both logistics experts and IT developers should be involved in the design stage of the solution. The logistics experts are responsible for providing professional insights and requirements of the industry and operations of every department while technical coding and programming tasks belong to the IT specialists.

To sum up, this EDI system powered by blockchain can ensure that standardized machine processable data is shared within a network of permissioned blockchain. This solution with its combined features from EDI and blockchain technology can tackle all the identified inefficiencies. Undoubtedly, there are many more considerations and efforts which is needed to bring the idea into practice. Additionally, making change in the core architecture of the information system may result in change of operation and business strategy upon corporate level. The questions towards the promising benefits, worthiness of the change and challenges arouse a great deal of controversy and they are discussed in the next sections.

4.5.3 Improvements

The solution is expected to eliminate those fore-mentioned inefficiencies and seek even more improvements in every-day practice of order management and shipping process. The embrace of blockchain technology into the current information system anticipates the technological and procedural development in order management's operating procedure and the whole logistics industry. The benefits of EDI and blockchain technology can be referred in the literature review. This section concentrates on revealing the practical improvements of the suggested solution in OM and freight forwarding industry.

✓ **Data standardization:**

The data transmitted through the solution is standardized which help eliminate double input problem, errors, reduces processing time and human involvement. EDI standards facilitate computer-processing efficiency without human

error. This improvement can help optimize the data-intensive operating procedure of OM department in particular and of the freight forwarding industry in general.

✓ **Efficient data communication:**

The integration of blockchain technology into current EDI transmission aims at ensuring transparency of trustworthy data- and document-sharing across the network of stakeholders who contribute to the shipment. This improvement of the solution can reduce the number of transactions for data and document exchange. By triggering and updating a document onto the system with just one transaction, all the permitted members in the network can hold a copy of the document for their process. The efficient data communication can be achieved.

✓ **Shipping procedure optimization – Frictionless global trading:**

A glance at the shipping and forwarding operation process illustrates the complexity and tight connections between each stage in which the later party needs certain types of documents issued by the former to start their job. The wasting time for scanning and transferring document electronically and/or physically to their clients and partners is sometimes prone to mistakes, delays or losses. That may lead to the consequence that the electronic document does not reach the right receiver in timely fashion which causes delays and probably costs in downstream activities like domino effects.

On the contrary, with blockchain-based data-sharing platform and necessary parties involved, documents are uploaded by issued party, officially authorized by selected nodes and are available to view along the chain which facilitate every party to kick off the process immediately after data or documents can be accessed. There is no longer delays by documents transferring from party to party.

The below given figure provides a comparison of Letter of credit process handled traditionally and when blockchain is applied. The example saw significant

procedural improvement in trade finance part which is a big help in customer's side to tackle problem of delays in documents delivery and acknowledge real time transactions.

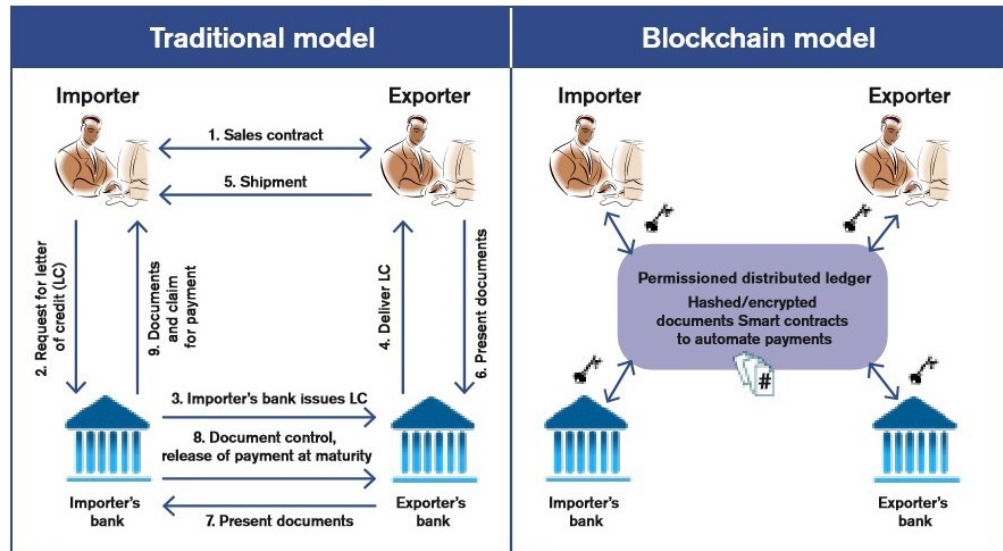


Figure 26. Letter of credit process comparison (Ganne 2017, 23)

Not only trade finance but also any other process in cross-border trade can be beneficial from what blockchain is expected to bring.

✓ **Transparent workflow:**

Every transaction done by any user is recorded onto the blockchain platform where all participants may have a view and acknowledge how the workflow is.

The capability of streamlining the workflow and mapping the chain helps parties mark milestones on the current stage of process which gives idea for planning the next stage or predicts problems beforehand. As a result, each party itself knows when and how to perform their job to support the smooth operation of the whole chain. The fact that there are different requirements about set of documents and licenses for custom declaration for shipment from and to different countries and regions. The whole workflow's transparency provides comprehensive and complete view for all involved party to avoid

discrepancies and deficiency. By this, it is possible to recognize a problem when it is existed, and proactive approaches can be taken before it is late.

✓ **Paperless trade:**

It is widely acknowledged that the evolution of a paperless trade world is achievable with blockchain technology (Ganne 2018, 19). Indeed, documents can be easily coordinated in a shared distributed ledger. It is beneficial in reducing physical document forwarding time and effort between parties both domestically and internationally. Thanks to the data transparency throughout the blockchain, data or documents can be available for accessibility for favored parties who require those for their process. By this, no time-consuming delay is caused by waiting for paper, for example, to physically reach the destination for import process starting. Moreover, it helps reduce administration costs and relieve stress from such current paper-intensive procedure.

✓ **Real-time visibility & responsiveness to potential disruptions**

With this solution, the transparency in the workflow and information flow together provides the involved parties with real-time visibility into the structure of their supply networks. Indeed, the visibility and real-time update can be considered as the master keys to unlock the map of supply networks which plays a crucial role in case of the emergence of potential disruptions. Instead of scrambling after a problem occurred, a potential disruption can be acknowledged in advance and the responsiveness can be ensured to secure the supply lines from upheavals. Thanks to end-to-end visibility, companies know which suppliers or factories are at risk and proactively plans can be generated quickly to secure their supply (Choi, Rogers & Vakil, 2020.) This improvement is expected to help upgrade especially the order management service in achieving resilient supply chain solution for customers.

The combination of EDI's and blockchain technology's features tends to bring numerous practical improvements to labor- and paper-intensive activities of international trade in general and especially in order management and freight forwarding industry.

It has to be admitted that digitalization is number one driving force for transformation of freight forwarding and logistics sector.

4.5.4 Challenges

Despite of its potentials in many use case such as streamlining operations and increasing efficiency, cryptocurrencies are the only successful application of blockchain technology. There is not a general consensus that this technology has embarked on its maturing process and it might be able deliver tangible value. Some opponents of this view contend on the Financial Times that blockchain is still in its infancy and the idea is overhyped (Murphy & Stafford, 2018.) The attitudes towards this topic varies between involved parties mainly due to different levels of IT infrastructure, technology capability and their own operations. It is no exaggeration to state that a full consideration and more researches in higher levels should be undertaken to broaden insights about this solution itself and the current context with special characteristics of the business sectors that is chosen to apply. Success is not a given. There must be a few constraints that prevent this cutting-edge technology from mass adoption despite of a ton of benefits it brings. With the involvement of more and more companies, governments officials and highly-skilled technology specialists in blockchain studies, this technology will see more practical applications in a near future.

➤ **Legal constraints**

The topic has been brought forward for discussion in the recent FIATA 2019 World Congress by Wyllie (2019), FreightPartner's founder, in his "*Technology in Logistics Themes and Customer Expectations*" presentation. The low uptake of blockchain can be attributable to the uncertainty in international trade laws and regulations.

There have been some legal issues which are considered as obstacle in the way of widespread adoption of blockchain application. One of them should be mentioned as legal validity of transaction issues, for example, how a blockchain transaction and data stored on blockchain platform can represent for real documents or assets. This problem has gained attentions from legal authorities

around the world. One of the most important step forward by the United Nations Commission on International Trade Law (UNCITRAL) is the publication of “*Model Law*” in 2017 concerning endorsement of electronic transferable records on blockchain-based platform (UN/CEFACT 2018, 65). The model law sets out terms and conditions which must be met to legitimize electronic records as legal transferable documents. Yet, the regulatory framework may take time to be adjusted and reflected in legislation to facilitate wide-scale blockchain employment. Meanwhile, various governments such as the eight US states, France and China have taken initiative actions towards recognizing blockchain transactions validity on their legislations. The World Trade Organization has also reported numerous submitted proposals which is related directly to blockchain application on electronic commerce (Ganne 2018, 99.)

There was an improved and optimistic perception of global enterprises towards regulatory barriers shown in Deloitte’s global blockchain survey.

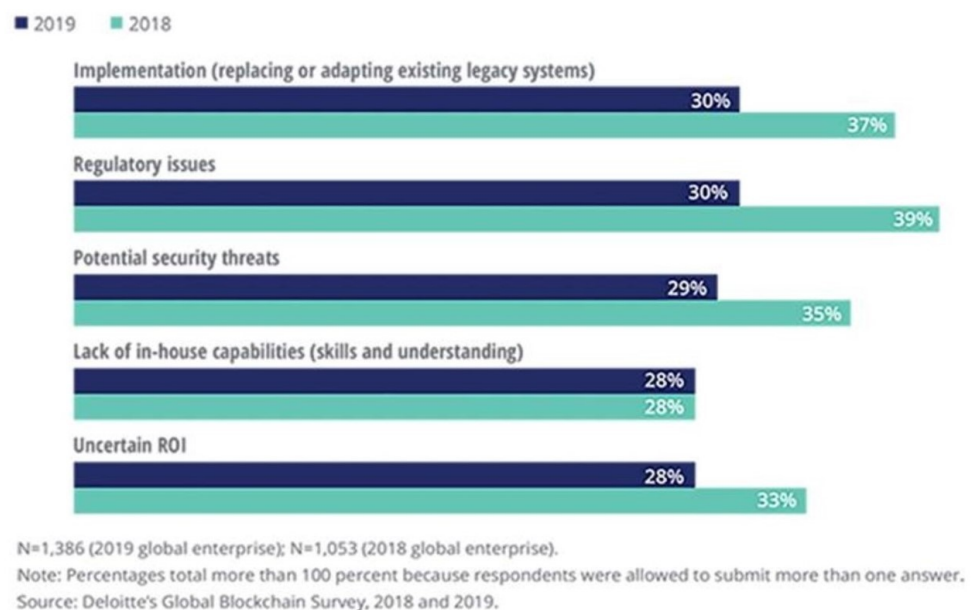


Figure 27. Identified barriers to blockchain adoption (Deloitte's Global Blockchain Survey, 2018 and 2019)

The situation is considered to be gradually improved that the number of respondents who viewed regulatory as a barrier to blockchain adoption has

decreased by 9% from 2018 to 2019 thanks to several approaches by international governments.

The great potentials of blockchain to global trade can only be reached fully by regulation approaches from governments globally. It is apparently that this challenge will be soon achievable thanks to a variety of approaches which has been taken to bring the future nearer than ever.

➤ **Investment and on-going maintenance**

The cost structure of building a blockchain-powered system, operational cost and ROI (Return on investment) are extremely important in new strategic adoption consideration but still remain unanswered. A suggested range should be helpful key point for organizations to take a step further in adopting the idea.

The amount of money for initial platform build cannot be small investment and it might depend on how complex the operations might be, how large a network of nodes can reach and several technical requirements. Besides of that, operational cost is even more important because it is involved in any one transaction throughout the lifecycle of the system. Uncertain ROI prospects has been one of barriers from blockchain adoption. Only when the cost per transaction is more cost-effective than the current system, will the solution be worth investing.

There is a research from EY about this topic and it helps provide an insightful idea about how total cost of ownership for blockchain solutions is built. EY has outlined four key drivers which affect total operational costs of blockchain solutions which are:

- Transaction volume
- Transaction size
- Node host method (blockchain storing method)
- Consensus protocol (block of transaction verifying method)

Inputs	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Daily transaction volume	250,000	50,000	500,000	500,000
Transaction size	Large – 500 bytes	Medium – 250 bytes	Small – 150 bytes	Medium – 250 bytes
Node hosting	Cloud-based	On-premises (existing technology)*	On-premises (new systems)*	Cloud-based
Consensus protocol	Proof of work	Proof of authority	Byzantine fault tolerance	Proof of stake

Scenario 2		Year 1	Year 2	Year 3	Year 4	Year 5
	Onboarding costs		\$97,720	\$3,868	\$3,676	\$3,495
Cloud costs		\$0	\$0	\$0	\$0	\$0
Ongoing maintenance costs		\$140,640	\$140,456	\$140,275	\$140,099	\$139,927
Monitoring costs		\$4,233	\$4,096	\$3,966	\$3,842	\$3,725
Total costs		\$242,593	\$148,420	\$147,917	\$147,436	\$146,975

\$ 833,341 Total fixed costs over 5 years	\$ 166,668 Average annual cost	18 250 000 Annual transactions	~ \$ 0 Variable cost per transaction	~ \$ 0.009 Average transaction cost
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Figure 28. Transaction cost calculation [Adapted from Blockchain cost model and scenario by EY]

The scenario 2 is highly recommended and fits the suggested solution in this research. Therefore, the author decided to especially analyse the scenario 2 to get an idea of transaction cost for this case. Adapted from cost framework made by EY, transaction cost has been calculated and it is under 1 cent per transaction in this example. Besides, the costly initial platform build for this such scenario 2 can reach \$600,000 also reported in EY’s research.

Since this is early stages of blockchain implementation, these numbers cannot tell exactly how it reflects in Expeditors’ solution and how the range can be. But still, the example shows a promising savings and improvement in transaction when blockchain is employed in current system.

➤ **A Lack of interoperability**

The blockchain-powered system involves many players in the network and there would be different chain to deal with every account. The problem might belongs to each player’s information system. While the solution can be applied into Expeditors’ existing system, it must be taken into consideration how it is integrated into the other players’ current information system to facilitate communication between nodes throughout the chain.

The right approach to overcoming this barrier belongs to collaboration of all players of the chain in a large scale. Some strategic partner can be early involved in design stage with the corporate while the other can be reached by survey on their existing system and their expectation for the change. Professional in business and logistics field should be included in to guide the process of programming the system.

➤ **A Lack of skilled developers**

There is no doubt that the demand for blockchain talent has straighten significantly recently. Indeed, they are the main driver to transform the planned solution into a concrete practical one. However, the new technology still take time for exploration and education which leads to an acute shortage of qualified developers. The increased demand of blockchain specialists has been seen the most growth in U.S companies by over 40% in 2019.

Many of IT engineers are in their blockchain-related course trainings and only when they finish their study, will the gap between market demand and resources of skilled developer be narrowed down.

Together with challenges, several approaches have been in discussion and the outcomes shall be generated to pave the way for blockchain technology deployment. Actions from global enterprises, government officials, IT organizations and players in value chain are considered as contributions to the mainstream adoption.

5 Conclusions

The objectives of the research were achieved and presented to the commissioning party. There were totally four research questions, as follow, proposed for this study to achieve the overall goal.

1. What is order management service and what is the key area for development after doing benchmarking with competitors?
2. How to handle a shipment with the order management service from start to finish?
3. What are the inefficiencies in the operating procedures and what are their causes?
4. What could be the solution to address those inefficiencies? What are the improvements and challenges?

The first question was related to market research for order management service where target customers, service description were put in place for doing benchmarking. The benchmarking provides insights into the success factors of the company itself over its biggest competitors and the area for development. As a result, the technology in information system was targeted for seeking innovations. However, the technology information system consists of many areas such as internal data recording, data management, business data analysis, or external data communication in B2B (business to business) or B2C (business to customer) model and much more. Therefore, further consideration was needed to narrow down the research focus.

The second research question aimed at delving deeply and thoroughly into the current operating procedure of order management service in collaboration with other parties in the value chain. Participating into the setting gave the most comprehensive and practical perspectives on how the process is actually carried out. A complete picture of OM operating procedure was presented in section 4.3. It contributes to the inefficiencies' cause analysis and reveals the current information communication solutions of Expeditors.

Data about procedural inefficiencies were collected by interviewing the true specialists of order management. The cause analysis was proceeded, and those inefficiencies were fully explained with examples and evidences. In reference to the identified development area in the first question, the area of focus was narrowed down to technological development in B2B data communication solution. Additionally, some suggestions were mentioned briefly to develop the idea for overall solution. From that, the

solution should include the feature of machine-enabled data processing of EDI system and end-to-end data-sharing architecture, and simultaneously the solution should be able to facilitate the use of electronic documents (E-docs) instead of paper-based ones.

In the last section, research on the current communication solutions of the company was performed to outline what should be improved. More specifically, EDI system is already available for use, so that the end-to-end data sharing architecture should be determined. Overall, blockchain-powered EDI data-sharing was suggested as the outcome of this thesis. Improvements and challenges of blockchain implementation was also discussed.

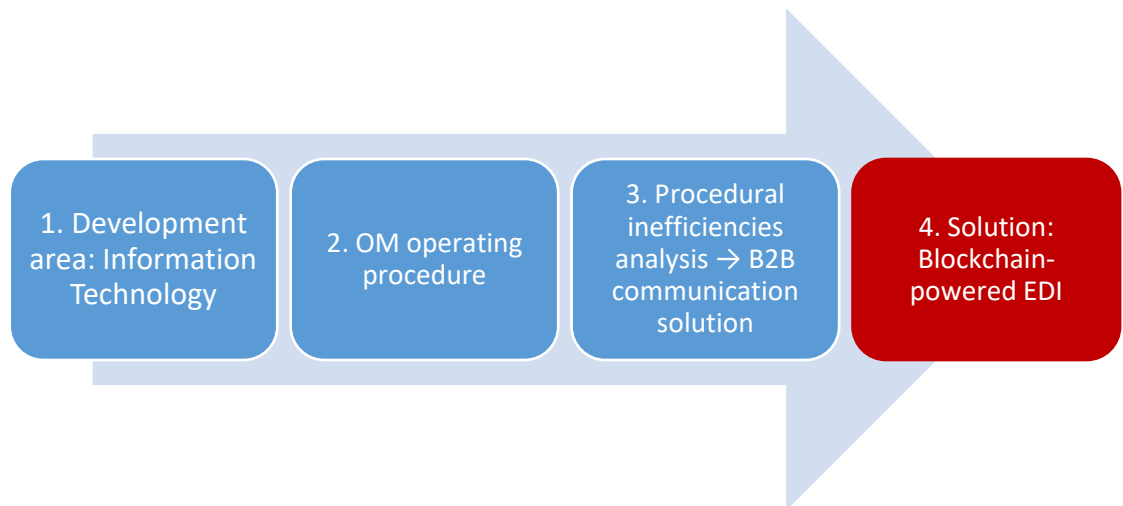


Figure 29. Research development procedure

The research saved the best for the last. Therefore, each finding in the previous research questions was integrated with each other and represented for a step which logically leads to the overall result of the whole research answered in the last question. To conclude, blockchain integration into the current EDI system was suggested to solve the inefficiencies and raised the idea for innovation. Identified challenges in the current context were discussed. Since, there have been a plethora of research and approaches from many organizations and governments towards the blockchain technology, it is likely that the technology deployment can be achieved in a near future with more practical applications.

6 Discussion

The adoption and diffusion of blockchain technology with whole supply chain involved may take decades' effort while applying blockchain architecture into current EDI system may be quickly achievable but render huge improvements and business value for Expeditors' information business. Expeditors has publicly asserted their actions forward and consideration about blockchain technology integration.

“Blockchain appears to be the buzzword of the year, but what exactly is it? How will it affect the supply chain industry? As a company, we are asking ourselves the same questions and have already taken the next step forward.” – Expeditors

It is apparent that solution suggested by the researcher somehow fits into the company's perception and development strategy.

It should be clarified that there was no considerable problem caused by those identified inefficiencies in the current working procedure of the department. The purpose of this research was to propose a possible solution for long-term improvements rather than with the narrowed aim of only eliminating the inefficiencies. Not only inefficiencies in order management service can be dealt with, but also other functions might be positively affected by the suggested solution.

A lack of information about the availability of IT specialists at Expeditors might create a constraint to measure this solution development process. Moreover, this solution was suggested based mostly on theoretical and speculative review at the present time. The biggest barrier for this research was a shortage of practical industry applications. The one and only successful application of blockchain technology so far may belong to cryptocurrencies with mass adoption. Blockchain technology is not overhyped but it is in its infancy period currently. Therefore, this research demonstrated the scope for further projects when the technology is in maturing process in order to judge the degree of applicability of this solution.

In the current situation, it has not yet the peak time of blockchain technology due to several existing challenges which take time to be adjusted and overcome. This early sketch of blockchain solution in EDI transmission was act as a suggestion for future concerns and outlined challenges that should be firstly overcome to lead to the promising achievement.

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